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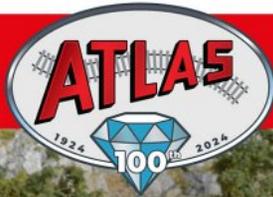
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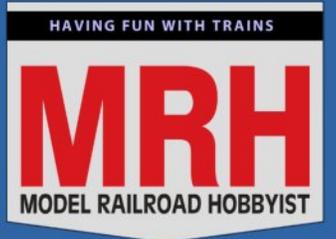
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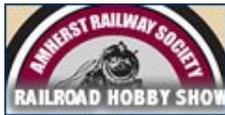


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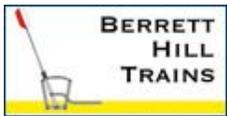
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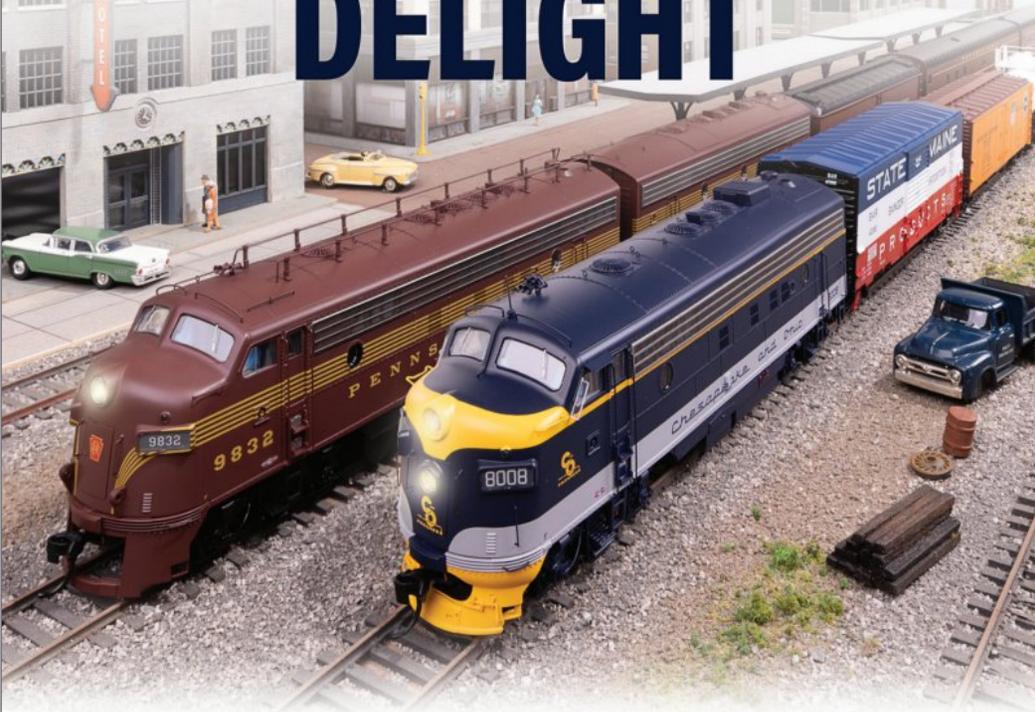
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JOE FUGATE



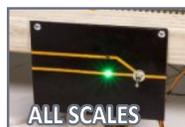
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What's Neat: Laying realistic track, ...

KEN PATTERSON



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JOE FUGATE



Ken Hanawalt's Turtle Creek layout tour

JOE FUGATE



3D printing insights from the Steam Throttle project

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PUBLISHER'S MUSINGS



Model Railroad Hobbyist | July 2024



JOE FUGATE ON HIS JOURNEY IN THE HOBBY AND THE FUTURE ...

I'VE DISCUSSED MY JOURNEY IN THE HOBBY IN PAST EDITORIALS, but we've had a lot of new folks joining MRH in the last year or two, so I think it's time for a review. I'd like to look at where I've been, and where I'm going with my own model railroading pursuits.

This is me taking off my MRH Publisher hat and putting on my "Joe the model railroader" hat.

In 1987 I attended my very first NMRA National Convention, which happened to be in Eugene, Oregon, my "home stomping grounds" since I grew up in southern Oregon. At this convention, I discovered the Layout Design Special Interest Group (LDSIG), and elected to become a member.

I didn't know it then, but joining the LDSIG turned out to be one of the smartest things I've ever done. The LDSIG's publications gave me many new insights on how to think about layout design.

For instance, the LDSIG published a discussion they had among the members on layout height. As part of the discussion, the SIG interviewed existing layout owners about the heights of their layouts.

Many of the layout owners had built their layouts from 40" to 48" from the floor - but when asked what they would do if starting over, most said they would build higher the next time!

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It is insights like this that led to the design recommendations I make today – build high and narrow. Aim for benchwork in the elbow to armpit range, to express it ergonomically.

If you drop much below elbow level, you start to get too much of a helicopter view of the trains, and if you go above armpit height, it becomes difficult to reach into the scene to uncouple cars or to do maintenance on the track.

While designing one of my freelanced Northern Railway layout plans, I kept thinking about how to add interchanges to the Tacoma, Washington yard on my plan. I got the idea to add an interchange with the Southern Pacific – even though the SP



1. Thanks to the LDSIG discussion in the late 1980s about what makes the most satisfying layout, I went back to my railroading roots and elected to model the Southern Pacific's Siskiyou Line in southern Oregon where I grew up. In hindsight, that was excellent advice because modeling this SP line made for a deeply satisfying layout with my Siskiyou Line 1.

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never made it that far north. I was freelancing, so why not?

The idea of having the SP on my layout got me really excited. And that's when it hit me – if the SP got me that excited by just having it make an “appearance” on my layout, why not just model the SP? Duh!

In fact, the Layout Design SIG recommends you look back to what first got you interested in trains, then consider making that your basis for modeling. By doing this, you'll probably have the most passion for the hobby, and get the most satisfying and fulfilling layout as a result.

The Southern Pacific's Siskiyou Line ran right by my house when I was growing up in southern Oregon. It captured my attention as a young boy, and instilled in me a passion for railroading, mountain



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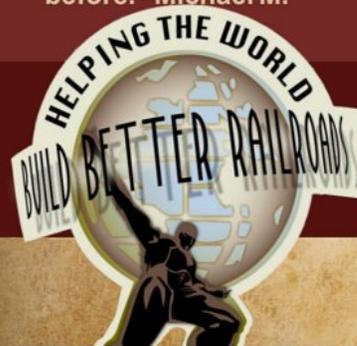
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style. By going back to these roots and modeling the SP Siskiyou Line, I could rekindle my original passion for railroading every time I entered the basement!

The LDSIG's advice turned out to be great wisdom indeed! I am thoroughly satisfied with my choice of prototype, and if starting over (more on this in a bit), I would build essentially the same layout modeling the SP in southern Oregon.

There is a part of me that loves freelancing – in my research of the prototype SP Siskiyou Line, I learned about the Coos Bay, Roseburg, and Eastern that built a rail line east out of Coos Bay in the late 1800s. While this line was never completed, it did make it as far as the foot of the Oregon Coast mountains before running out of funds.

The SP purchased the line in the early 1900s and then connected it with Eugene by running the line north up the Oregon coast and then over the Coast Range west of Eugene.

Later, a good model railroading buddy of mine from Roseburg, Nick Lehrbach, found a 20-some-foot-long surveyor's linen with the complete route of the Coos Bay, Roseburg, and Eastern laid out on it! Talk about tangible evidence – this is the route that almost was!

I knew Roseburg would be the focal point of my Siskiyou Line, so why not assume the Coos Bay, Roseburg, and Eastern actually was built as originally planned. This would give me a way to scratch the freelancing itch, yet keep it entirely plausible!

I officially started construction of my HO Siskiyou Line on May 1, 1991. We had moved into a new house with a large basement a few months earlier, and because I kept active in the hobby and doodled a lot of track plans in the 1980s, by the time I actually had space for a layout, the track plan came together in just a few months time.

I showed the then under-construction Siskiyou Line 1 at the 1994 NMRA National in Portland, Oregon, and I drove the golden spike in 1997, completing the mainline. Shortly thereafter, I started formal monthly operating sessions on the layout.



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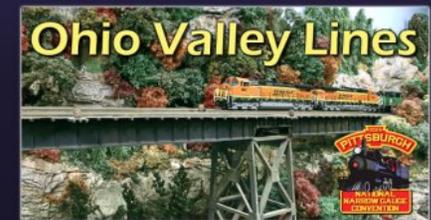


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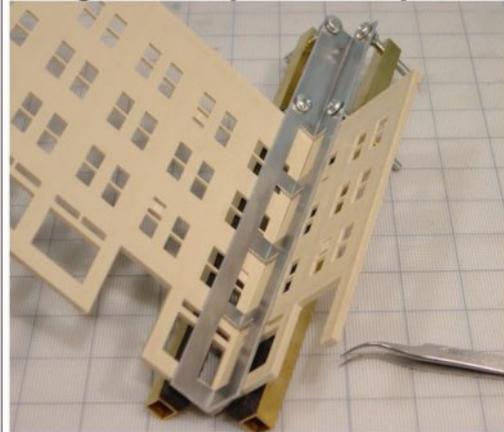
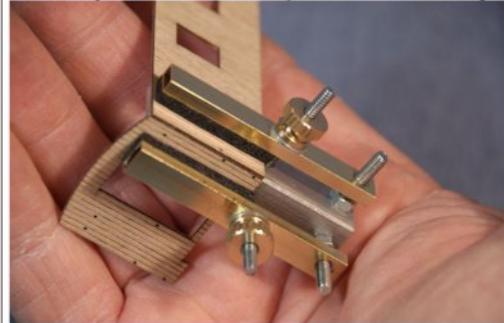


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PUBLISHER'S MUSINGS | 5

After 26 years of enjoying my first Siskiyou Line layout, our lives changed, and we relocated from Portland, Oregon to Oklahoma to prepare for our retirement years.

Siskiyou Line 1 had to be dismantled since it's hard to sell a house when half the full finished basement has a wall-to-wall model train layout.

I saved all the rolling stock and locomotives, of course. I also saved thousands of trees and all the bridges. I saved all the lower quadrant semaphore signals and what few structures I had built.

WHERE DO I GO FROM HERE?

We downsized as part of our move to a nice manufactured home on a permanent foundation, but there's not much room for a layout in the manufactured home.

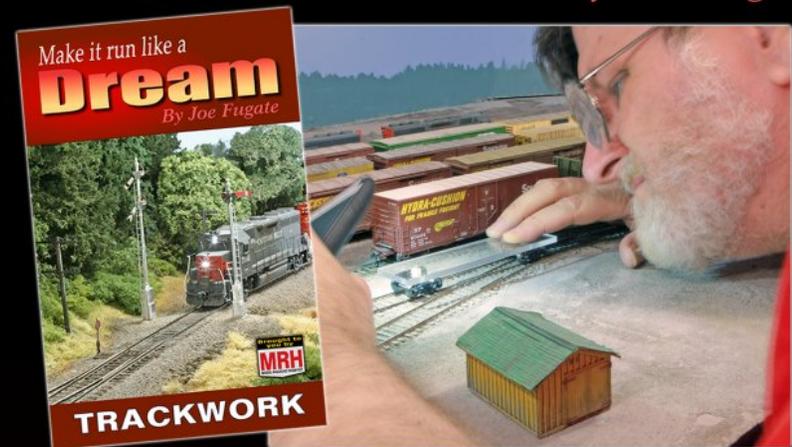
So we have also planned to stand up a 30x60 prefab steel building with space for a garage, safe room, MRH office, TrainMasters TV studio, workshop, and space for Siskiyou Line 2.

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I have been totally satisfied with Siskiyou Line 1, so Siskiyou Line 2 will follow an almost identical location, era, and prototype.

However, the new Siskiyou Line 2 (SL2) layout will use the TOMA (The "One Module" Approach) in its design and construction.

If your brain is wired to think in terms of traditional monolithic layout construction, then the idea of a sectional or modular home layout may seem strange or just plain silly. TOMA suggests that you instead build a home layout in bite-sized chunks using modules or sections.

The most novel part of TOMA is the idea of building a finished, operational layout as you go – finishing one or just a few module sections at a time.

The TOMA process encourages you be more realistic about doing the full hobby end-to-end, and to think more holistically about a layout project – but keep the scope at any one time small enough you can likely finish it in weeks or months instead of years or decades.

Remember Linn Westcott's *HO Railroad that Grows*? TOMA is the 21st Century version of that idea. At each step with TOMA, you have a finished-looking operational layout. But growing it is as simple as building another TOMA module.

I realize that TOMA is not for everybody, but it should be an option on the table along with more traditional monolithic approaches to doing a home layout before embarking on that dream layout project.

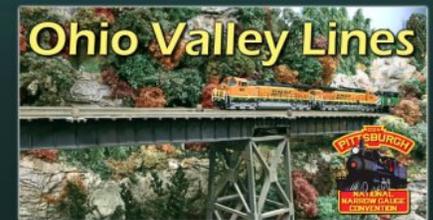
I've seen folks get all excited over filling their train room with benchwork because it goes up fast. But then things usually grind to a crawl as the real detailed work of the layout starts. Later, we often hear they tore it all out. And all too often, they leave the hobby, disillusioned.



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Through TOMA we hope to reduce the number of stillborn layouts, and get more modelers to expand doing the hobby beyond just building benchwork and laying track.

You always have a finished operational model railroad with TOMA instead of a still-born Plywood Pacific albatross in the layout room.

I can tell you as I gear up to design and build the Siskiyou Line 2, I'm more pumped about the hobby than ever. Having the chance to use the latest developments in the hobby has rejuvenated my passion in a way I never imagined.

As I reflect on MRH and the hobby today, no longer do my fellow model railroaders need to share my zip code - through the internet and MRH I can count among my circle of hobby friends anyone on the planet who is online and shares passion for having fun with trains. ☑

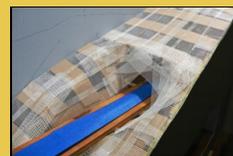
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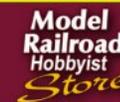
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Model Railroad Hobbyist | July 2024

Compiled by **JOE FUGATE**



Inspiring micro layouts

MRH forum member **NFG-RR** (Denzil S.) started a thread asking that folks post examples of their micro layout efforts. MRH author Greg Baker, who posted the photo above (and more) says:

"Here's mine: Somewhere in Eastern Oregon during the fall time. It's 12" x 24" in HO scale."

Visit this thread for some great tiny layouts!



[View the full thread on the MRH website](#)

▶ **MRH'S MONTHLY GREAT MODELER POSTS**

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1. *MRH* forum member **awkesholayout** (Lloyd H.) is journaling his rework of a layout scene to incorporate a large paper mill on the Canadian Pacific.

MHO Junction papermill

MRH forum member **awkesholayout** (Lloyd H.) has been journaling his reworking of a scene on his layout from his prior plans to now modeling a large papermill operation.

Lloyd says,

“This area was already planned for a coop and a paper recycling plant, but I was convinced to make a huge paper mill instead. The area is 12' by 20" and is protolance CP in the 70's.

“I've been working on designing and building a kitbashed paper mill building for my new industry, With left overs and parts from a new kit, I will make a backdrop building that will span 12'. I started by removing the back wall from an already built paper mill building and am using it for walls for the loading dock. While doing this I created paper rolls and the dock door canopies [1].”

Follow Lloyd’s entire process of designing and building this large papermill operation on his layout!

[View the full thread on the MRH website](#)



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2. *MRH* author and TMTV contributor Mike Confalone has started a new thread on the *MRH* forum covering all his recent layout updates, with awesome photos, of course!

Mike Confalone's Allagash

MRH author and TMTV contributor **Mike Confalone** has started a new thread discussing his recent updates to his popular Allagash Railway layout. Mike says:

"It's been a while since I've posted progress reports on the Allagash and shortline Oxford County here on *MRH*. There has been a lot of progress, and the railroad is nearing completion. I'd like to update the readers on several projects I've worked on in recent history ... I hope you enjoy the story!"

So follow along with Mike as he posts the juicy details on what's new in Maine railroading during the 1980s.

[View the full thread on the *MRH* website](#)

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3. *MRH* forum member **nscale4x8** (Erik B.) is modeling this ornate bank building in N scale using 3D printing. Simply amazing.

3D Printing 1889 Bank in Van Buren, AR

MRH forum member **nscale4x8** (Erik B.) has a thread on designing and 3D printing this ornate bank building in N scale. One forum member, Tony Anderson, said:

“I’ve admired that building for years, but I always considered it a near impossibility to model ... clearly, I was mistaken. I won’t live long enough to build it using traditional techniques, but this changes everything.”

For all the details of how Erik did this model, check out the thread on the *MRH* forum!

[View the full thread on the *MRH* website](#)

New “Give me a picture” thread

Kevin P. started a new monthly thread titled, “Give me a picture.” Ask for a photo subject, and if you fulfill the request, then *you* ask for a photo.

[View July “Give me a picture” thread](#)



4. *MRH* forum member **gmpullman** (Edmund T.) hit the jackpot this time, posting both of the amazing model photos shown here. The dramatic photo above came in answer to a request to show a photo with a bridge. That’s one amazing bridge photo there, Edmund. Talk about *WOW*.

5. *MRH* forum member **gmpullman** (Edmund T.) posted this photo as well to the “Give me a picture” thread. Edmund gave us this photo in answer to a “Give me a night scene” request and boy did Edmund deliver! This is definitely one of those “Yes, it’s a model” photographs.



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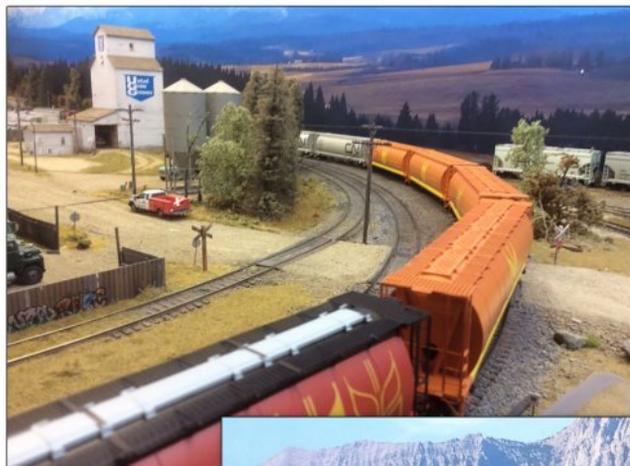
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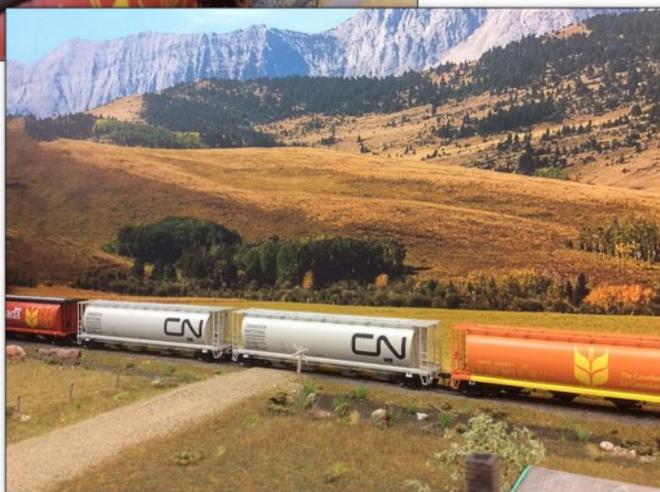
One of our customers just received his Marine Industries 4550. He sent this statement:

"Great job on the hoppers PWRs! The Marine Ind cars are very well detailed, worth the wait for Quality! Thanks Brent L."

Here are some images of them on his layout ...



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WHAT'S NEAT

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Model Railroad Hobbyist | July 2024

KEN PATTERSON COVERS THIS

MONTH:

- PRR S1 DUPLEX FROM BROADWAY LIMITED
- LAYING TRACK WITH GEORGE BOGATIUK
- QUICK TIP WITH KEN PATTERSON
- TYLER HANEY OF BACHMANN TRAINS

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PHOTOS AND VIDEO OF SUPERB MODELS

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THIS MONTH, Ken shows off the PRR S1 Duplex in HO scale from BLI, and George Bogatiuk shows how he lays track for an industrial siding. Ken's quick tip demonstrates a useful tool, while Bachmann's Trevor Haynes shows off some product samples at Bachmann Trains that will be arriving in stores soon.

Broadway Limited's PRR S1 in HO scale



1. Ken shows off the upcoming PRR S1 Duplex locomotive in HO scale. An experimental 6-4-4-6 locomotive, the S1 was the longest and heaviest rigid-frame (non-articulated) reciprocating steam locomotive ever built. With lines designed by Raymond Loewy, the S1 was also one of the most beautiful locomotives of the streamline era. With a shell of brass and a die cast chassis, the hybrid model will be available in several paint schemes – the standard PRR passenger scheme, the 1939 World's Fair scheme, unlettered, and a Tuscan Red fantasy paint scheme. The locomotive will be available in both the MTC21 DCC socket with speaker stealth series and with Paragon4 sound/smoke/DCC. Info: broadway-limited.com



Laying track with George Bogatiuk



2. George is laying track on a new section of his recently enlarged layout. While he uses Micro Engineering flex track exclusively, he uses Peco turnouts since there is a wider variety of them available than from Micro Engineering.



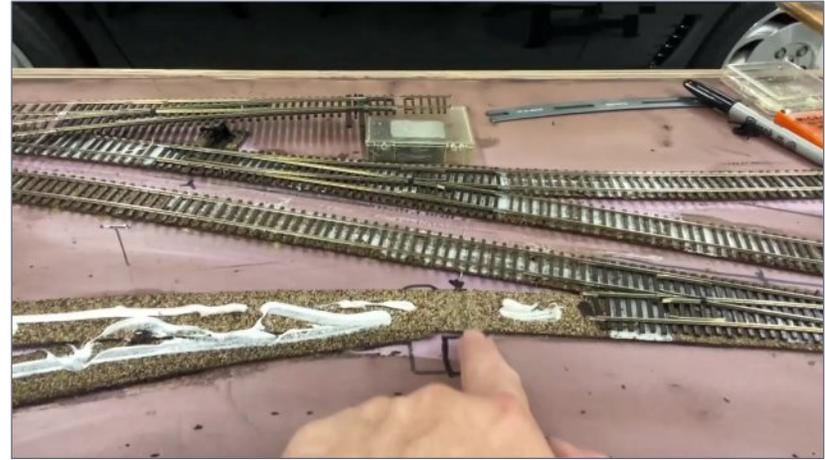
3. For this track, an industry spur, George wants to space the ties out to represent a lower-use section of track. To start this he cuts the webbing out of the ties.



4. With the ties disconnected, George will remove every fifth tie from the section of track.



5. George can then spread out the ties into the empty space, replicating the look of a lower-priority, low-speed industrial spur.



6. To hold the track down, George spreads a thin layer of construction adhesive on his cork roadbed. For industrial spurs and sidings, George uses lower-profile N scale roadbed. An industrial spur won't have the pretty ballast shoulders of a mainline track.



7. With the track glued in place and having used a radius template to ensure his minimum 36" radius is maintained, the track is ready for painting, ballasting, and weathering. After all, track is a model too.

Ken's Quick Tip: getting a fine mist from spray bottles



8. Ken demonstrates why you want a fine mist when spraying dilute white glue or scenic cement on your layout. Globbs of white glue or water will leave craters in your ballast and scenery.



9. Keeping a spray bottle misting properly involves preventive maintenance, such as cleaning any glue that clumps up on the mesh end of the suction stem.

Tyler Haney of Bachmann shows products arriving in stores soon



10. Coming in N scale are DCC-ready GP38-2s in Chessie, Milwaukee Road, Norfolk Southern, and BNSF. The models have a Next18 DCC socket included.



11. Bachmann is currently shipping a run of GP38-2s in HO scale as well, including this Amtrak locomotive. These locomotives are also DCC-ready with a 21-pin plug.



12. In addition to the Amtrak locomotive, there is a Missouri Pacific locomotive without dynamic brakes in this release.



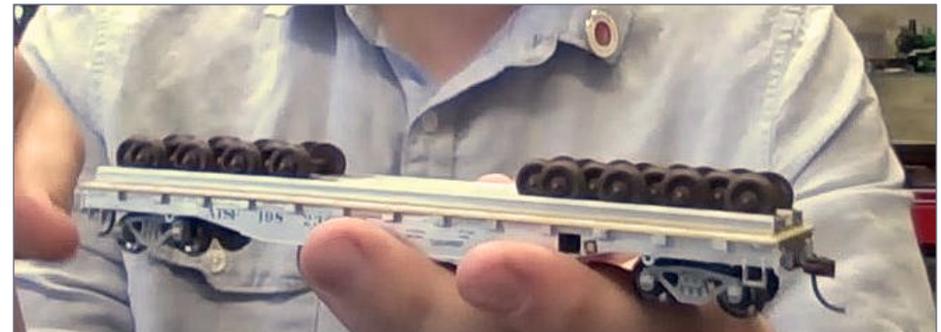
13. Painted samples of the HO scale 4180 Airslide covered hopper models have arrived at Bachmann, including CSX, GATX leasing, Burlington Northern, and Union Pacific.



14. The airslides include under-body brake and airslide piping detail.



15. HO scale coil cars in Reading and B&O are shipping now. The hoods are removable and swappable between cars, which also include six coil loads in the car.



16. Finally, this HO scale MoW wheelset transport car comes with 16 removable plastic wheelsets.

Info: bachmanntrains.com

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See the video at the beginning of the article for views of all the Broadway Limited PRR S1 locomotives, all of the techniques that George uses in laying track, Ken's complete Quick Tip, and all the different models that Tyler showed Ken, including a new sound-equipped HO scale steam locomotive. ☑



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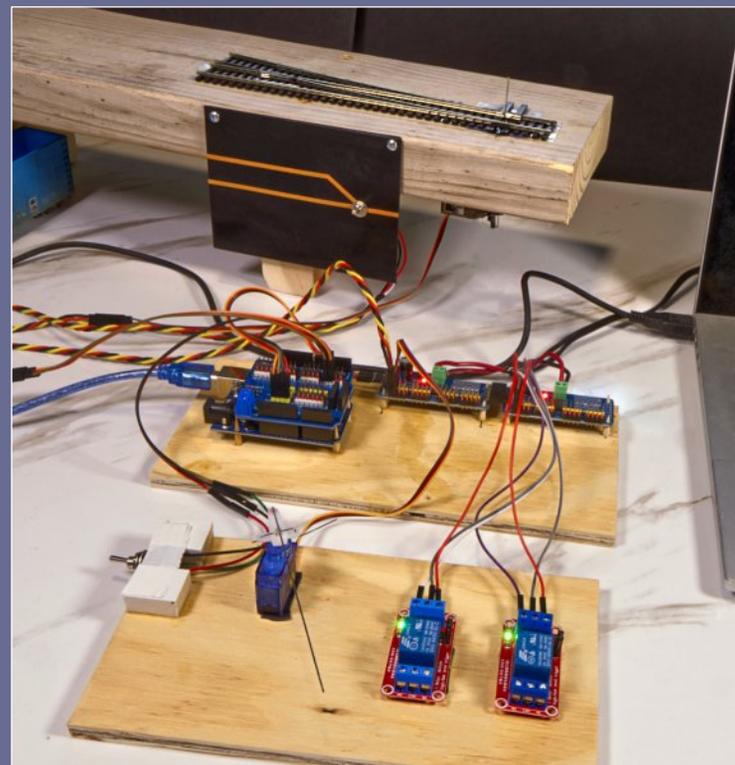
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USING SERVOS FOR TURNOUTS, PART 4



Electrical Impulses

1. In this final part, I replace microswitch frog power routing with logic-driven relay frog power routing. This is simpler than using a microswitch, and it's not that much more costly.

Model Railroad Hobbyist | July 2024



JOE FUGATE DISCUSSES FROG POWER ROUTING WITH RELAYS, PLUS LAYOUT WIRING RECOMMENDATIONS ...

USING SERVOS FOR TURNOUTS, PART 4 | 2

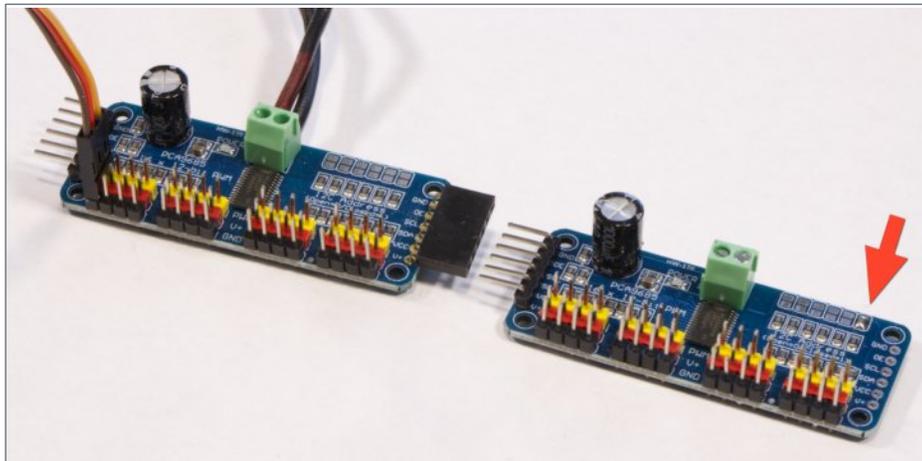
THIS TIME, instead of using a microswitch to route frog power, let's use logic-driven relays. Let's also look at layout wiring best practices when using Arduino turnout servo control. We'll finish up by showing a simple way to add LEDs to the control panel to clearly indicate turnout position at a glance.

USING LOGIC-DRIVEN RELAYS

Logic-driven relays cost about 70 cents more per turnout than a microswitch, and they move frog power routing out from under the benchwork to near the Arduino turnout control center.

I don't know about you, but it's worth 70 cents more per turnout to avoid having to crawl around under the benchwork to adjust the throw on a microswitch that has gotten out of adjustment.

Last month I showed how to add a second PCA9685 board daisy-chain style by soldering a 90-degree, six-pin socket on the right end of the board. Then just plug in the second board[2].



2. Connecting PCA9685 board for driving the logic-driven relays. Bridging the rightmost pad changes the board address from 0x40 to 0x41 (see arrow).

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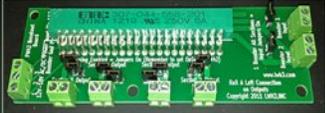
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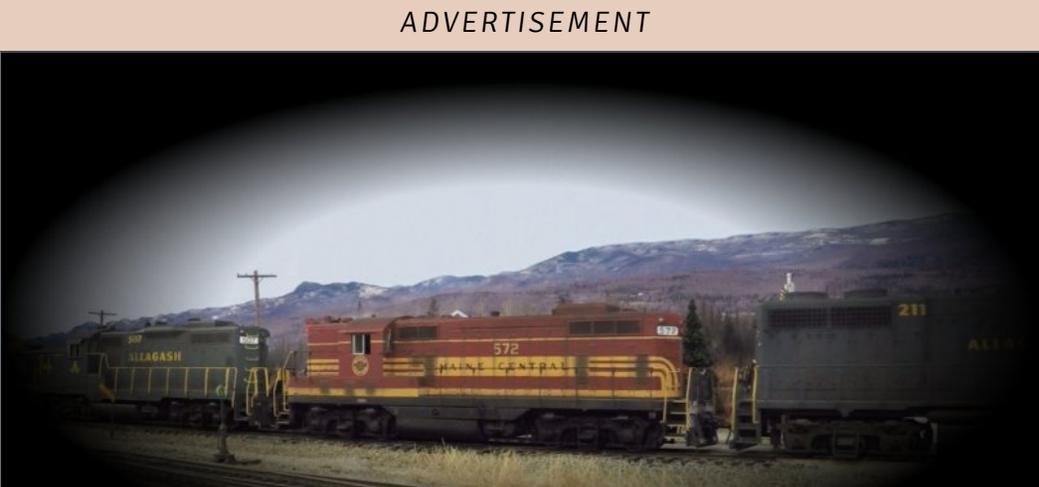
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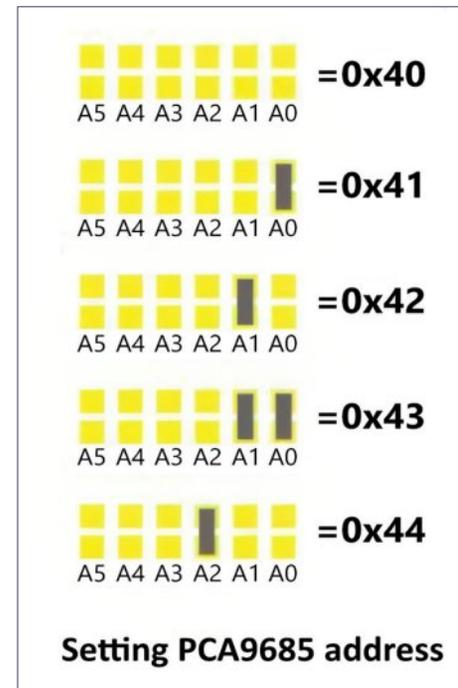
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You must set each board you add to a unique address by bridging some combination of the pads on the upper right of the board with solder [2]. In [3], I show how to set a few specific board addresses by bridging a combination of pads with solder. For a complete list of all possible PCA9685 board addresses, see:

mrhmag.com/magazine/url/pca9685-addresses

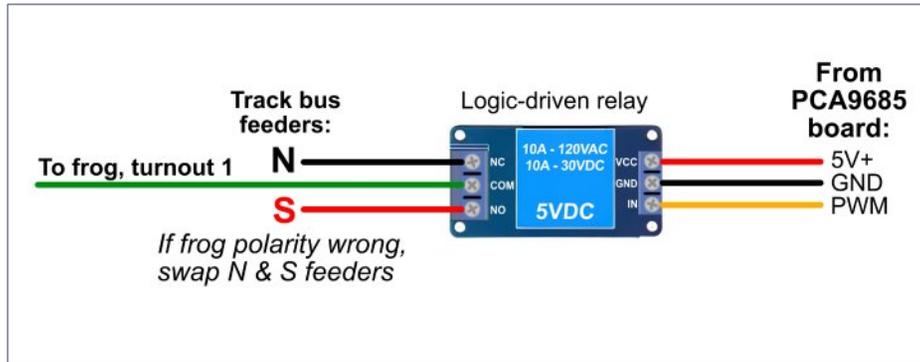
Wiring a logic-driven relay to the PCA9685 board works similarly to the servos – they have a +DC in, a -DC (ground) input, and a signal wire, which we connect to the PWM pin on the 9685 board [4]. Like the servos, the relays need current beyond what the Arduino can supply to operate properly, and that's what the two green terminals of +5V and GND supply. Nice and neatly taken care of thanks to the 9685 board.

You can get both 12V and 5V logic-driven relays. I recommend the 5V ones, since that matches the PCA9685 board's 5V feed which supplies the extra current. Just about perfect!

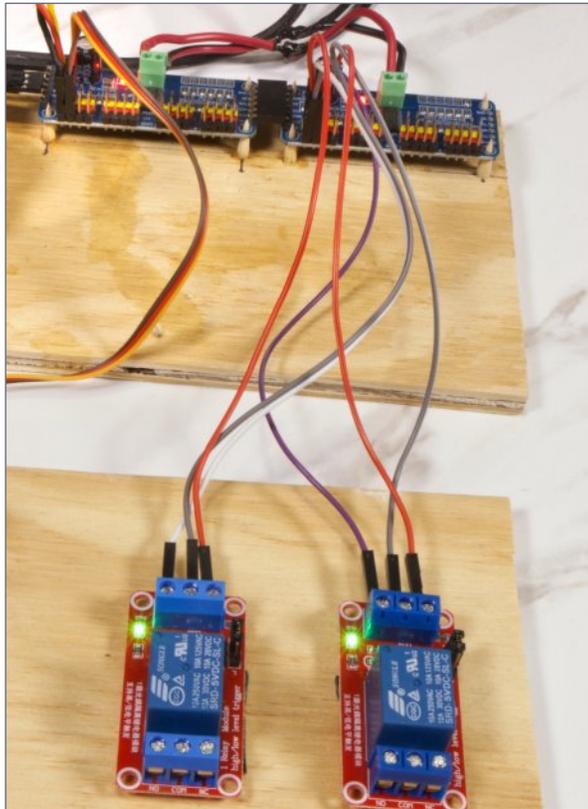


3. Some example PCA9685 board addresses using a solder bridge on the addressing solder pads. The “x” in the address means the number is written as a “hexadecimal” or base-16 number, common when programming computers.

USING SERVOS FOR TURNOUTS, PART 4 | 4



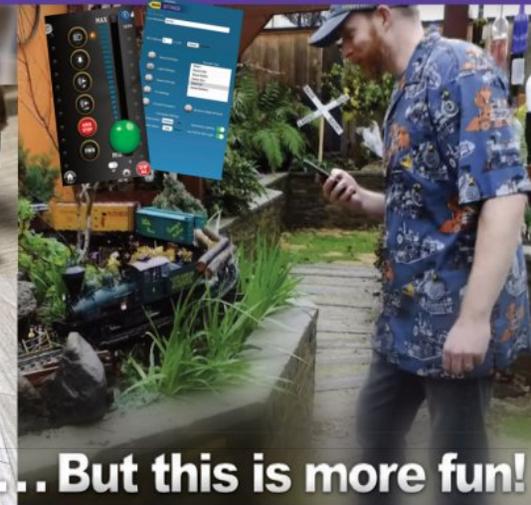
4. Here's how a logic-driven relay is wired. See text for details.



5. Here I have plugged in two logic-driven relays per the wiring diagram [4]. With two toggles and two servos in my test circuit, I have added two relays to the second 9685 board, on the same pins as the servos on the first board (pin 0 and pin 1).

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USING SERVOS FOR TURNOUTS, PART 4 | 5

I added two relays to my test circuit to match the two toggles and the two servos. Here's how the connections work for two turnout:

Turnout 1:

- Toggle 1, connects to Arduino pin 2
- Servo 1, connects to PCA9685 board 1 pin 0
- Relay 1, connects to PCA9685 board 2 pin 0

Turnout 2:

- Toggle 2, connects to Arduino pin 3
- Servo 2, connects to PCA9685 board 1 pin 1
- Relay 2, connects to PCA9685 board 2 pin 1

Each toggle goes to a pin on the Arduino, and it throws one servo and one relay for frog power routing. I'm using the same pin on each 9685 board for the servo and the relay, since the same toggle controls both. Using matching pins on each board to control the servo and relay for a single turnout keeps it nice and simple.

As stated in past articles, Arduino pins 2-13 and A0-A3 give us 16 pins on the Arduino UNO for toggles. Then each PCA9685 board supports 16 devices – 16 servos for board 1 (0x40) and 16 relays for board 2 (0x41).

Once I had the relays wired up [5], I wrote a little sketch to test the relays and make sure everything was connected properly and worked as expected.

RELAY TEST SKETCH

I wrote a simple sketch to test the relays. I'd like to use keyboard keys to control each relay as follows:

Q: relay 1 off

W: relay 1 on

E: relay 2 off

R: relay 2 on

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USING SERVOS FOR TURNOUTS, PART 4 | 6

Let's dive right into the code. We start out with the "includes" as usual:

```
#include <Wire.h>
#include <Adafruit_PWMServoDriver.h>
```

Next, let's define some PCA9685 values for full-on and full-off. With various PWM values for the servos, we can control servo position, but for the relays, we only need two settings - totally on (HIGH) and totally off (LOW).

```
const int RELAY_OFF = 4096; // turns 9685 pin fully off (low)
const int RELAY_ON = 4095; // turns 9685 pin fully on (high)
```

If you're wondering why 4096 turns the PWM output off, we're using a trick that Adafruit has documented in their PCA9685 board instructions. The maximum PWM value is 4095 for fully on, so by using a value that's out of range (4096 or more), the pin goes completely off. That's a neat little trick!

Next, we instantiate a PWM board instance, this time for address 0x41. We call it **Relays** to document how this board instance is to be used.

```
Adafruit_PWMServoDriver Relays = Adafruit_PWMServoDriver(0x41, Wire);
```

Now on to the one-time setup section.

```
void setup() {
  Serial.begin(9600);

  Wire.begin();
  Relays.begin();
  Relays.setPWMFreq(1600); //frequency suited to controlling relays
}
```

The **Serial.begin** initializes the serial window so we can use the keyboard and receive text messages. The **Wire** and **Relay** begins initialize the wire library and the relay board instance for use. Finally, a frequency of 1600 is best suited for controlling relays, so we set that value on the relay board. If you recall, we set the frequency for servos to 60, which is much lower.

On to the run loop to check for key presses and operate the relays.



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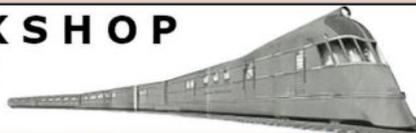
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USING SERVOS FOR TURNOUTS, PART 4 | 7

```
void loop() {
  char inChar = (char)Serial.read();

  if (inChar == 'q') {
    Relays.setPWM(0,0,RELAY_OFF);
    Serial.println("Set relay pin 0 LOW (on)");
  }

  if (inChar == 'w') {
    Relays.setPWM(0,0,RELAY_ON);
    Serial.println("Set relay pin 0 HIGH (off)");
  }

  if (inChar == 'e') {
    Relays.setPWM(1,0,RELAY_OFF);
    Serial.println("Set relay pin 1 LOW (on)");
  }

  if (inChar == 'r') {
    Relays.setPWM(1,0,RELAY_ON);
    Serial.println("Set relay pin 1 HIGH (off)");
  }
}
```

This is very similar to the servo calibrate sketch we did where we used keystrokes to move and calibrate the servo rotation. It's actually simpler here because we only have two "positions" for the relays – on and off.

The way these logic-driven relays work involves some reverse logic where HIGH is off, and LOW is on. When the relay is off (NC connected to COM), the red LED on the relay board is off. When the relay is on (NO connected to COM), the red LED is lit. You will hear a distinct click sound when the relay throws.

With this test done, let's add relay logic to our layout-ready code.

LAYOUT-READY CODE WITH RELAYS ADDED

With everything wired up as shown in [6] and with the relays tested using the previous sketch, we're ready to do the



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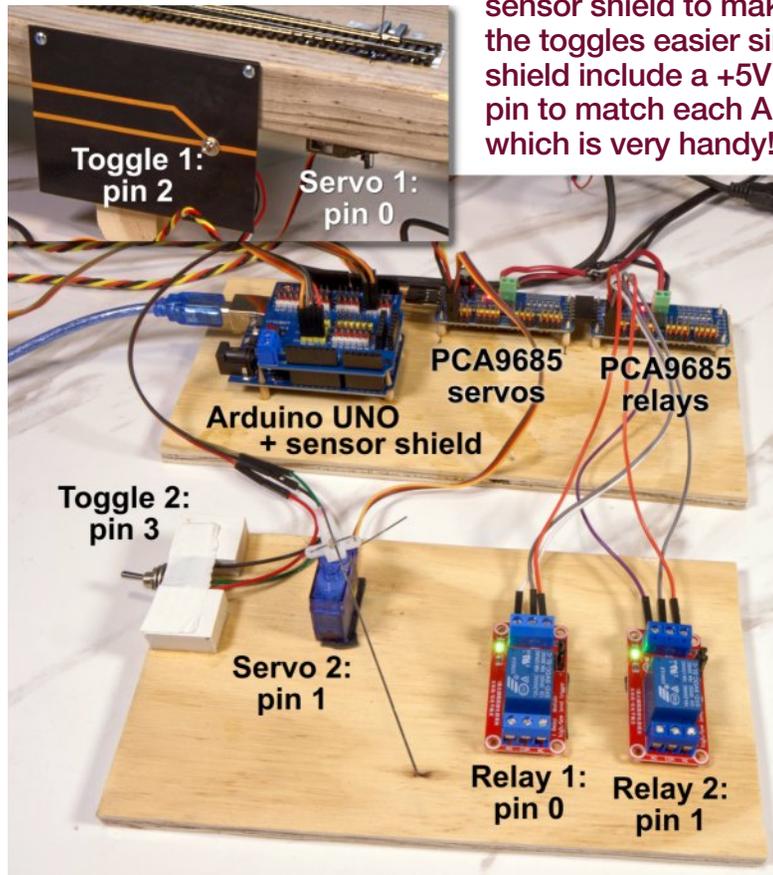
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layout-ready-servo-control-with-relays sketch. You can just wire the relays as shown, and use the sketch provided in this month's bonus download link at the end of the article. You should be golden.

If you want to know what coding we added to the layout-ready sketch, let me present the full sketch from last month, and highlight the new relay code in red. You should recognize the relay code from the relay test sketch we did previously.

6. Here's the complete wiring setup with two toggles, two servos, and two relays. You can also see I'm using the Arduino sensor shield to make wiring the toggles easier since the shield include a +5V and GND pin to match each Arduino pin, which is very handy!



```
#include <Wire.h>
#include <Adafruit_PWMServoDriver.h>

const int SERVOMIN = 125; // min value for full left servo throw (zero degrees)
const int SERVOMAX = 625; // max value for full right servo throw (180 degrees)
const int SERVO_OFF = 4096; // pulse value that turns the servo pin off
const int RELAY_OFF = 4096; // pulse value that turns the 9685 pin fully off (low)
const int RELAY_ON = 4095; // pulse value that turns the 9685 pin fully on (high)

Adafruit_PWMServoDriver Servos = Adafruit_PWMServoDriver(0x40); // servo 9685
Adafruit_PWMServoDriver Relays = Adafruit_PWMServoDriver(0x41, Wire); // relay 9685

#define NUM_SERVOS 2 // <-- Put the number of servos you using here ***
typedef struct {
  int ServoPin;
  int TogglePin;
  int ServoNormal;
  int ServoThrown;
} TurnoutDefSt;

/* *****
Put your servo pins, toggle pins, and servo angles here, one
row for each turnout ...

Code assumes toggle is mounted vertically and not-thrown (down) = LOW,
toggle thrown (up) is HIGH.

If it's backwards, then flip around the not-thrown and thrown angles
in the table.
***** */

const TurnoutDefSt TurnoutDef[NUM_SERVOS]= {
  {0,2,75,130}, // <-- servo pin, toggle pin, not-thrown angle, thrown angle
  {1,3,80,130}
};

int CurrentServoPos[NUM_SERVOS]; // current angle of each servo (current state)
int servoGoal; // target angle of the active servo
int relayGoal; // target position of relay (on or off)
```

```

void setup() {
  Serial.begin(9600);
  Serial.println("PCA9685 Layout turnout driver v1");
  Servos.begin();
  Servos.setPWMPFreq(60);
  delay(30);

  Wire.begin();
  Relays.begin();
  Relays.setPWMPFreq(1600); //frequency suited to controlling relays
  delay(30);

  Serial.println("Set toggle & turnout initial position to match toggle.");
  for (int i=0; i<NUM_SERVOS; ++i) {
    pinMode(TurnoutDef[i].TogglePin,INPUT); // set toggle pin to input
    int toggleState = digitalRead(TurnoutDef[i].TogglePin); // align servo to match toggle
    if (toggleState == LOW) {
      CurrentServoPos[i] = TurnoutDef[i].ServoNormal;
      relayGoal = RELAY_OFF; // low = relay off
    } else {
      CurrentServoPos[i] = TurnoutDef[i].ServoThrown;
      relayGoal = RELAY_ON; // high = relay on
    }
    Servos.setPWM(TurnoutDef[i].ServoPin, 0,
      setServoAngle(CurrentServoPos[i])); //match toggle to servo
    Relays.setPWM(TurnoutDef[i].ServoPin, 0, relayGoal); //default relay to match toggle
    delay (10);
    //Serial.print("Array row ");
    //Serial.print(" ServoPin: "); Serial.println(TurnoutDef[i].ServoPin);
    //Serial.print(" TogglePin: "); Serial.println(TurnoutDef[i].TogglePin);
    //Serial.print("ServoNormal: "); Serial.println(TurnoutDef[i].ServoNormal);
    //Serial.print("ServoThrown: "); Serial.println(TurnoutDef[i].ServoThrown);
    //Serial.println("-----");
  }
}

void loop() {
  for (int i=0; i<NUM_SERVOS; ++i) {
    int toggleState = digitalRead(TurnoutDef[i].TogglePin);

```

```

    if (toggleState == HIGH) {
      servoGoal = TurnoutDef[i].ServoNormal;
      relayGoal = RELAY_ON;
    } else {
      servoGoal = TurnoutDef[i].ServoThrown;
      relayGoal = RELAY_OFF;
    }
    delay(50);
    // Serial.println("CurrentServoPos: " + CurrentServoPos[i]);
    // Serial.println("servoGoal: " + servoGoal);
    if (CurrentServoPos[i] != servoGoal) { // servo doesn't match toggle
      Serial.print("Move servo "); Serial.print(TurnoutDef[i].ServoPin);
      Serial.print(" from: "); Serial.print(CurrentServoPos[i]);
      Serial.print(" to: "); Serial.println(servoGoal);
      // move servo to desired angle
      Servos.setPWM(TurnoutDef[i].ServoPin, 0, setServoAngle(servoGoal));
      CurrentServoPos[i] = servoGoal;
      // toggle relay
      Relays.setPWM(TurnoutDef[i].ServoPin, 0, relayGoal);
      delay(50);
    } else { // servo already in position, turn off to prolong servo life
      Servos.setPWM(TurnoutDef[i].ServoPin, 0, SERVO_OFF); // turn the servo off
      delay(50);
      // Serial.print("Servo servoGoal: "); Serial.println(servoGoal);
      // Serial.print(" Servo at: "); Serial.println(CurrentServoPos[i]);
      // Serial.println(" -- Servo already in position, servo turned off");
    }
  } // end of for i loop
}

/*
 * setServoAngle(int ang)
 * gets angle in degrees and returns matching pulse value
 */
int setServoAngle(int ang) {
  int pulse = map(ang, 0, 180, SERVOMIN, SERVOMAX);
  // Serial.println("Angle: " + ang);
  // Serial.println("Pulse: " + pulse);
  return pulse;
}

```

Hopefully you can see that adding the relay logic to the layout-ready sketch wasn't too tough, and it works great. In [7] and [8] you can see the new layout-ready sketch with added relays in action.

Now all we need to do is wire up the C, NC, and NO pins as shown in [9], and frog power routing is fully controlled and accessible for maintenance without crawling under the layout.

The frog power routing will never get out of alignment, and if maintenance is needed (a relay goes bad), it's a quick and easy replacement and we're in business again.

LAYOUT WIRING BEST PRACTICES

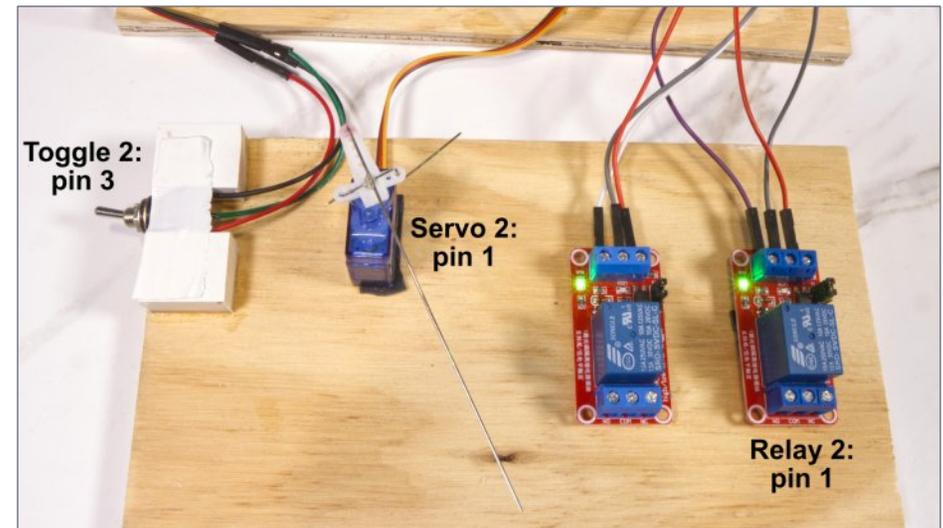
It's one thing to have an Arduino project at the workbench that runs nicely, with wires a few inches long between components. How do we translate that from the workbench to operating turnouts on a layout?

The data signal from an Arduino to the PCA9685 boards, and to toggles, servos, and relays, can only run so far before the signal degrades enough to no longer be reliable.

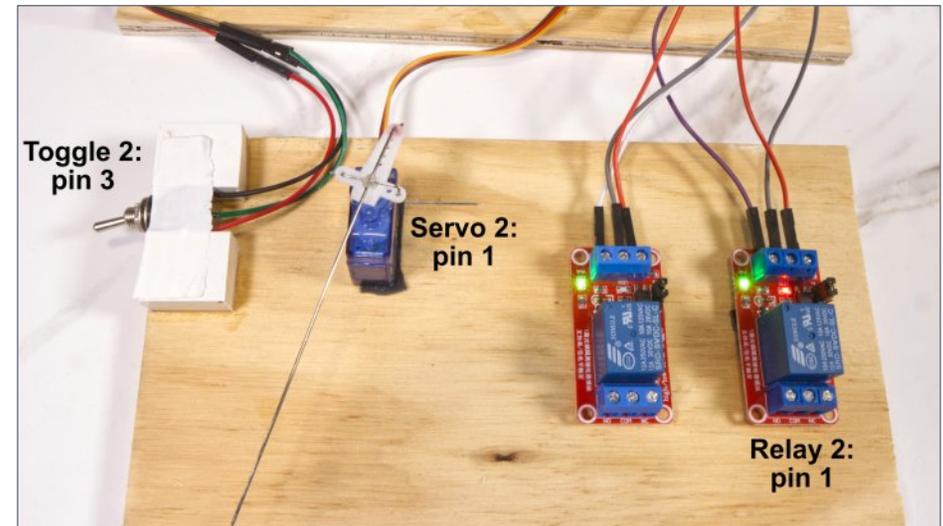
First, the PCA9685 boards use an I2C signal, which is designed to run a few feet at most. That means we need to build what I'm going to call a "town hub," with an Arduino board and the PCA9685 boards right next to it.

With an Arduino UNO and a PCA9685 board, we can run 16 turnouts from a hub. Or if you want to use relays to route frog power, then the hub consists of an Arduino UNO and two PCA9685 boards

With an Arduino Mega and four PCA9685 boards, it's possible to run up to 64 turnouts from a single hub, but that's beyond the scope of this series. The layout sketch I provide only goes to 16 servos on one PCA9685 board.



7. Toggle 2 controls servo 2 and relay 2. Here, the toggle is up with the servo rotated to its full-right position as set in the sketch, and the relay is off.



8. I throw toggle 2 down and servo 2 rotates to its full-left position, and the relay switches to on (note the red LED).

The length of wires we can run to the toggles, servos, and relays can go farther. Looking online, I find 28 feet as a recommended maximum run of servo cables from an Arduino-PCA9685 board hub. With the hub at the center, a 28-foot-radius circle is a total of 56 feet across.

I read a note from Duncan McCree of TAM Valley, and he's gone out to 50 feet with servos using his signal enhancers, but he admits that's pushing it.

I used 25 feet of three-wire twisted 20AWG servo cable between servo 1 and the hub, and another 25 feet of three-wire twisted 20 AWG cable from the hub to toggle 1. That's a total run from toggle to servo of 50 feet.

The result? It works fine, no problem, no misfires whatsoever. However, it's important to run 20AWG twisted cable to minimize getting noise on the wire – more on that later.

This means the safe practical limit from a central Arduino “town hub” to the furthest turnout is 25 feet – spread across a circle 50 feet wide. Not bad!

Given all this, we must place the Arduino UNO and the PCA9685 boards right next to each other. Even though the relays could potentially be spread all over the layout near the turnouts, I prefer to also place them next to the Arduino and the PCA9685 boards as part of the hub.

It's not difficult to run a single long frog wire to each turnout from each relay. And if I get a relay failure, I like having them right at the “town hub” for maintenance instead of spread all over the layout. I don't mind running a few long frog feeders to keep from having to crawl around under the layout.

ACTUAL LAYOUT EXAMPLE

Let's look at how to set up these Arduino “town hubs” on an actual layout. I'll use my Siskiyou Line 1 layout plan – even though this layout is now dismantled, it still serves as a useful example.

The idea is to get as close to 16 turnouts as possible in each “town zone,” and keep the total run from the furthest turnout to an Arduino “town hub” in the center that's less than 25 feet from the furthest turnout. Here's what I came up with studying my Siskiyou Line track plan:

Siskiyou Line 1 example	Town zone	Nbr turnouts	Max run ft
Staging + Dillard west switch	A	16	20
Cottage Grove + West RH	B	16	20
Oakland, Sutherlin + East RH	C	10	10
East Roseburg	D	10	5
West Roseburg	E	14	12
Camas Valley + Remote	F	7	15
Myrtle Point + Coquille	G	14	15
Coos Bay East	H	12	5
Coos Bay West	I	15	5

By reviewing layout plans [10] and [11], you can see how I would deploy these town zones on Siskiyou Line 1. Note the centralized placement of each Arduino “town hub” for each zone. My maximum wire run is 20 feet to the most distant turnouts at Rice Hill and Dillard. Most runs are 10 to 15 feet, with the two in Coos Bay yard only 5 feet.



J. Fugate

SIMPLIFY THE WIRING

One nifty add-on to the Arduino is something called a Sensor Shield. For about \$5, you can get some very handy extra feeds for each pin on the Arduino.

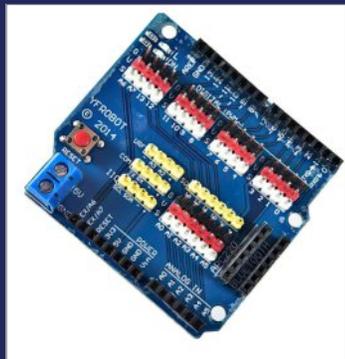
For example, each toggle feed out of the Arduino needs the I/O pin, +5V, and GND – a total of three wires per toggle. The Sensor Shield provides all three feeds for each Arduino pin, which makes wiring up the toggles super easy.

To wire each toggle, I take a jumper wire with a female pin on one end, snip off the other end, and solder each to the toggle's metal tabs. I make sure to use different colors so I can keep the wiring straight, and that gives me a set of wires with female pins on them for each toggle.

Now I can take a three-wire servo cable with one male end and one female end, and plug it into the Sensor Shield for a given pin, such as pin 2. I also get the +5V and GND as well. On the other end, I plug the center wire from the toggle into the yellow cable wire, plug the 5V toggle wire into the red cable wire, and plug the GND toggle wire into the black or brown cable wire (cables vary on the GND color).

It also has a handy set of I2C pins for the PCA9685 board as well.

If you take a close look at the photos of the complete wiring, you will see how the Sensor Shield makes wiring super-easy.



8a. Adding a Sensor Shield piggyback onto your Arduino UNO gives you lots of +5V and GND feeds to the toggles.

TWISTED-WIRE CABLES

When running digital data cables between toggles, servos, and relays, it's quite helpful to use twisted cables, particularly for cable runs of more than a couple of feet [12].

To reduce electromagnetic interference, twisting the wires together creates a canceling effect. Any interference/noise in one wire is essentially canceled by the interference/noise on the other wires, helping to keep the signal clean.

For longer runs, we also want larger wire than the common 22-26AWG servo jumper wires.

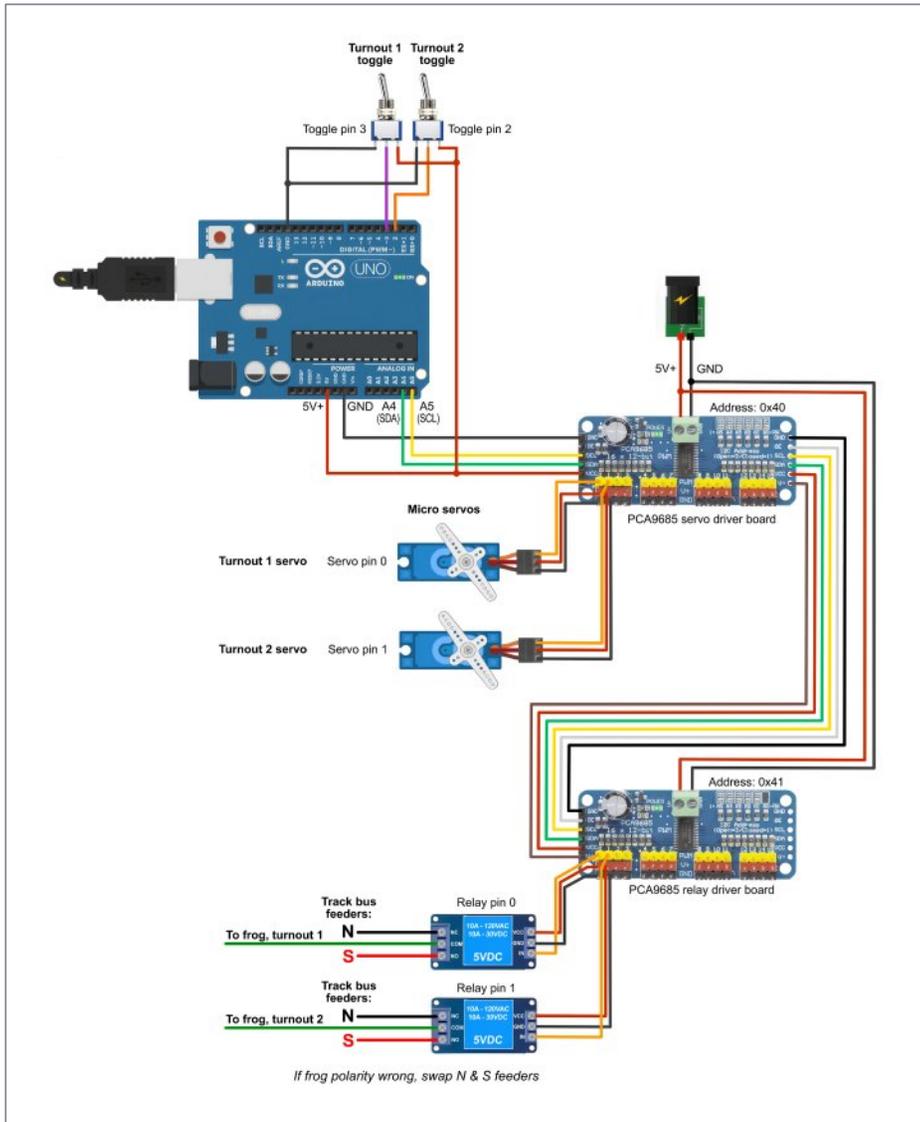
I found some 5-foot twisted 3-wire servo cables that use 20AWG wire on Amazon for about \$1 per foot (see shopping list at end of the article). For a 25-foot run to a servo and a 25-foot run to a toggle, that \$50 worth of wire using five sets of these cables connected end-to-end. While convenient, that's not very economical.

As a side note, I purchased 10 of these 5-foot extension wires to test a 25-foot run from the toggle to the Arduino, then from the PCA9685 board back out 25 feet to the servo. As mentioned earlier, it worked fine with no misfires or missed toggle throws. Two thumbs up!

One way to economize is to buy twisted three-conductor servo wire in bulk. I can find bulk twisted 20AWG servo wire for 47 cents per foot, essentially half price. That's still \$25 worth of wire for a turnout and toggle each 25 feet from the Arduino hub.

The answer: make your own twisted wire cables from bulk 20AWG wire and servo connectors. I can buy wire to make three-conductor cable for 5 cents per foot, and another 25 cents each for the 3-pin connector at each end. That's \$3 worth of wire for the 25' toggle-to-Arduino and 9685-to-servo run.

Much better!



9. In this layout-ready circuit, we have one toggle on UNO pin 2 controlling one servo on PCA9685 board pin 0. To control more servos, add more toggles on pins 3-13 and A0-A3, for a total of 16 toggles. Likewise, add more servos to pins 1-15 of the PCA9685 board, for a total of 16 servos.

It does take learning how to make a uniformly twisted 3-conductor cable and how to properly put the connectors on the ends. But once you have this technique down, you can make servo and toggle cables of any length for a few dollars per turnout at most. Shorter wire runs will cost less, of course. In next issue's *Electrical Impulses*, Peter Randerson and I show how to make these cables on the cheap.

POWER BUS CONSIDERATIONS

All these devices (and the LEDs I will show in a bit) use 5V power feeds. At 2A per hub, a larger layout like the Siskiyou Line with nine town hubs would need a whopping 18 amps.

Rather than run one or more high amp accessory power buses around the layout, it makes more sense to run 110V extension cords around the layout with power strip drops at towns, and then use inexpensive USB power plugs that you plug into the power strip to feed the power.

A typical USB power block provides 2.1A, and often has multiple sockets for USB cables. You can also get a power-plug USB cable that, coupled with a screw terminal adapter [15], allows plugging male-end jumper cables in and tightening down the screws. All neat and tidy, also see [18] and [19].

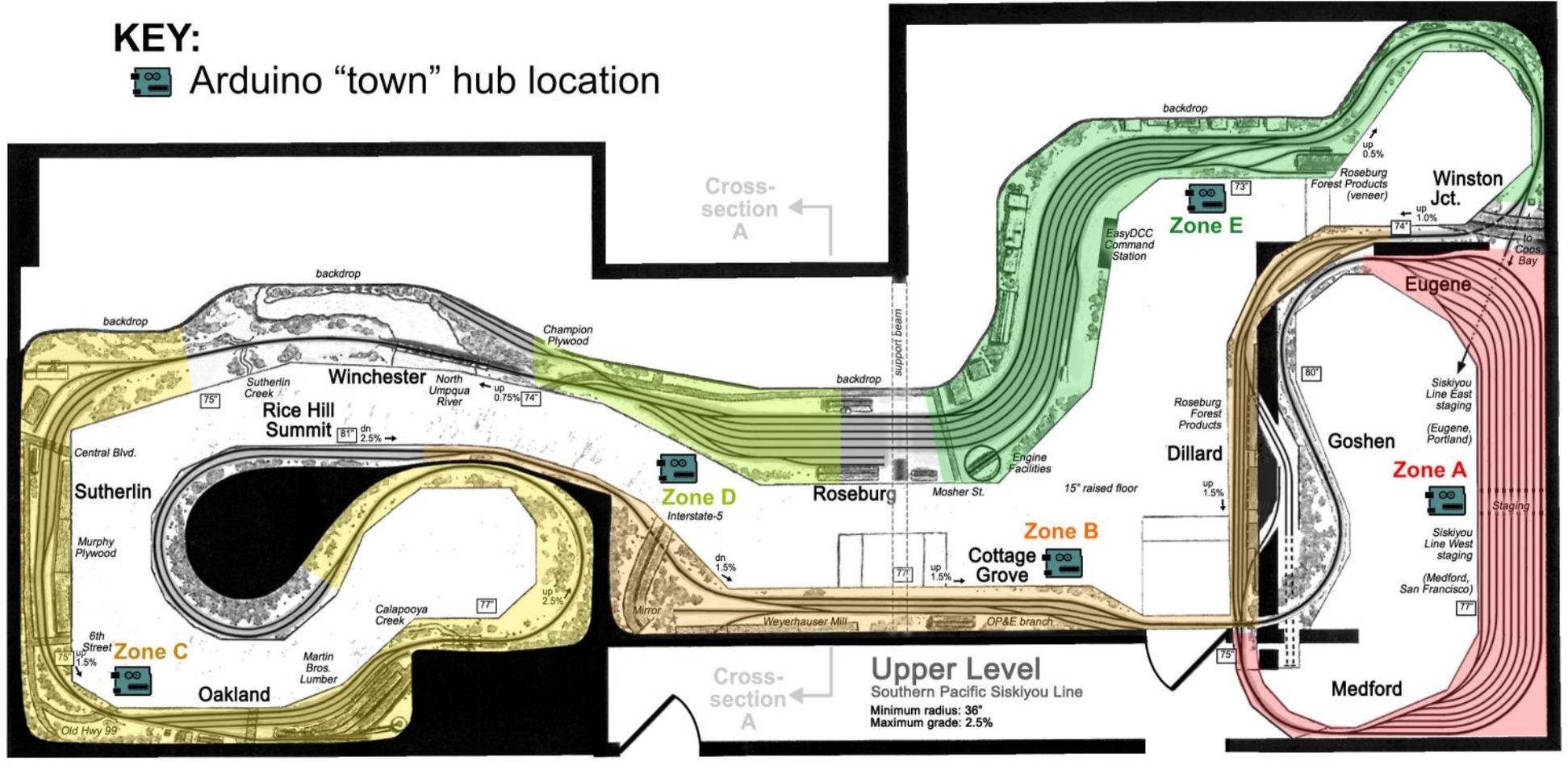
Total cost is about \$2.50 per 5V power feed, straight from a USB block plugged into a power strip.

For my Arduino town hub that has one Arduino Uno, two PCA9685 boards (one for servos and one for relays), and LEDs on the control panels (more on that in a bit), I have one USB power block with three feeds: one feed goes to the Arduino socket, one feed goes to the PCA9685 boards (forks out to each board), and one feed goes to a terminal strip at the town control panel to feed the panel LEDs.

[Text continues on page 24 →](#)

KEY:

 Arduino "town" hub location



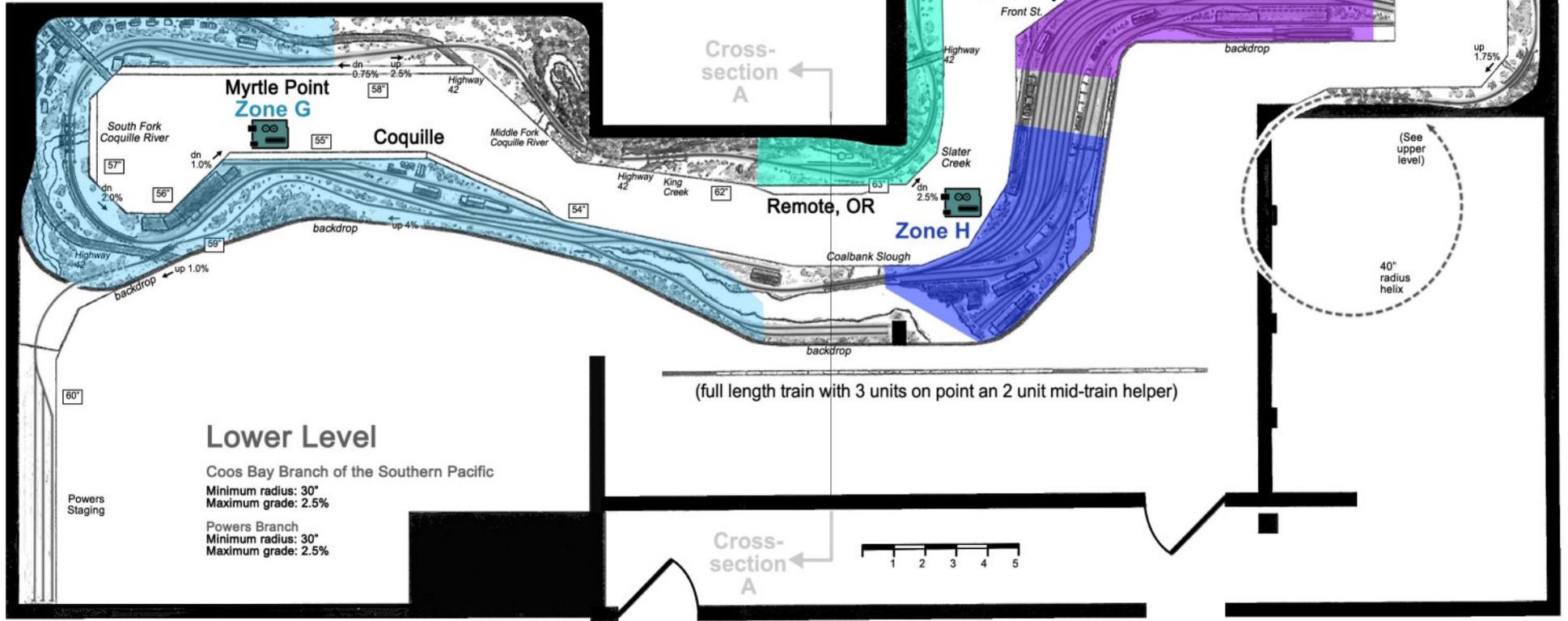
10. Here's how I would place the "town hubs" on the upper level of my Siskiyou Line 1. For details, see the text.



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KEY:

 Arduino "town" hub location



11. Here's how I would place the "town hubs" on the lower level of my Siskiyou Line 1. For details, see the text.



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One three-socket USB block with cables feeds an entire Arduino town hub, and no special low-voltage high-current power bus needed. Just AC extension cords and power strips mounted on the benchwork around the layout. Creates a lot of handy plug-ins for tools when working on the layout, too!

ADDING LEDs TO A CONTROL PANEL

It's handy to have LEDs on your control panel indicating which way the turnout has been thrown. By upgrading from a SPDT toggle to a DPDT toggle (costs about the same), you can add LEDs as I show in [18] and [19].



12. The best long-distance wires (more than a couple of feet) between the toggles, servos, and relays use these three-conductor twisted-wire 20AWG cables.



13. These three 5V USB blocks supply 2.1A per block. That works out to be around 90 cents per power feed.



14. You can get one of these USB power adapter cables for about \$1.50. Use it with a USB block [13] and an adapter [15] to get a handy power feed for the components in the Arduino town hub shown in this series.



15. Using this adapter with the cable in [14], you can easily insert jumper wires for the +5V and GND feeds out of a USB power block. You can see this in use to feed LEDs in [17] and [20].

Cost comparison

Now that we know what it takes to implement servo turnout control, let's summarize the total cost and compare it to a Tortoise solution.

Servos for turnouts			
Item	Cost ea.	Nbr	Total
Arduino UNO	\$10.00	1	\$10.00
PCA9685 board	\$4.70	2	\$9.40
Sensor shield	\$4.50	1	\$4.50
Jumper wires	\$0.06	8	\$0.48
sub-total			\$29.38 cost per "town"
Servo	\$3.40	1	\$3.40 Low as \$2 ea for cheap servos
Toggle switch	\$0.54	1	\$0.54 SPDT or DPDT similar cost
Microswitch	\$0.28	1	\$0.28
Jumper wires	\$0.06	6	\$0.36
sub-total			\$4.58 Cost per turnout with microswitch \$3.18 With cheap servos
LEDs	\$0.05	2	\$0.10
150 ohm resistors	\$0.30	2	\$0.60
sub-total			\$0.70 Cost per turnout to add panel LEDs
Servo	\$3.40	1	\$3.40 Low as \$2 ea for cheap servos
Relay	\$1.19	1	\$1.19
Jumper wires	\$0.06	11	\$0.66
sub-total			\$5.25 Cost per turnout with relay \$3.85 With cheap servos

16. Cost of using servos to control turnouts.

Tortoise for turnouts			
Item	Cost ea.	Nbr	Total
12v power supply	\$25.00	1	\$25.00
Power bus per foot	\$0.18	100	\$18.00
sub-total			\$43.00 Cost for Tortoise power bus
Tortoise	\$18.00	1	\$18.00
Toggle switch	\$0.54	1	\$0.54
sub-total			\$18.54 Cost per turnout with Tortoise

17. Cost of using Tortoises to control turnouts.

Hypothetical layout: 1 town, 5 turnouts

Tortoise total cost	\$135.70	\$27.14 <-- per turnout
Servos with microswitch	\$52.28	\$10.46 <-- per turnout
Servos with relay	\$55.63	\$11.13 <-- per turnout

Hypothetical layout: 1 town, 10 turnouts

Tortoise total cost	\$228.40	\$22.84 <-- per turnout
Servos with microswitch	\$75.18	\$7.52 <-- per turnout
Servos with relay	\$81.88	\$8.19 <-- per turnout

Hypothetical layout: 2 towns, 25 turnouts

Tortoise total cost	\$506.50	\$20.26 <-- per turnout
Servos with microswitch	\$173.26	\$6.93 <-- per turnout
Servos with relay	\$190.01	\$7.60 <-- per turnout

Hypothetical layout: 3 towns, 50 turnouts

Tortoise total cost	\$970.00	\$19.40 <-- per turnout
Servos with microswitch	\$317.14	\$6.34 <-- per turnout
Servos with relay	\$350.64	\$7.01 <-- per turnout

Hypothetical layout: 5 towns, 100 turnouts

Tortoise total cost	\$1,897.00	\$18.97 <-- per turnout
Servos with microswitch	\$604.90	\$6.05 <-- per turnout
Servos with relay	\$671.90	\$6.72 <-- per turnout

Hypothetical layout: 10 towns, 250 turnouts

Tortoise total cost	\$4,678.00	\$18.71 <-- per turnout
Servos with microswitch	\$1,438.80	\$5.76 <-- per turnout
Servos with relay	\$1,606.30	\$6.43 <-- per turnout

Not included: cost of wiring to and from turnout

The more turnouts, the lower the per-turnout cost gets. ■

I use a green LED to indicate the turnout is set to the normal route through the turnout, and a red LED to indicate the turnout is thrown to diverging.

Adding the LEDs is straightforward with a DPDT toggle as shown in toggle section on this circuit diagram [20]. You can see it in action in photos [18] and [19].

CONCLUSION

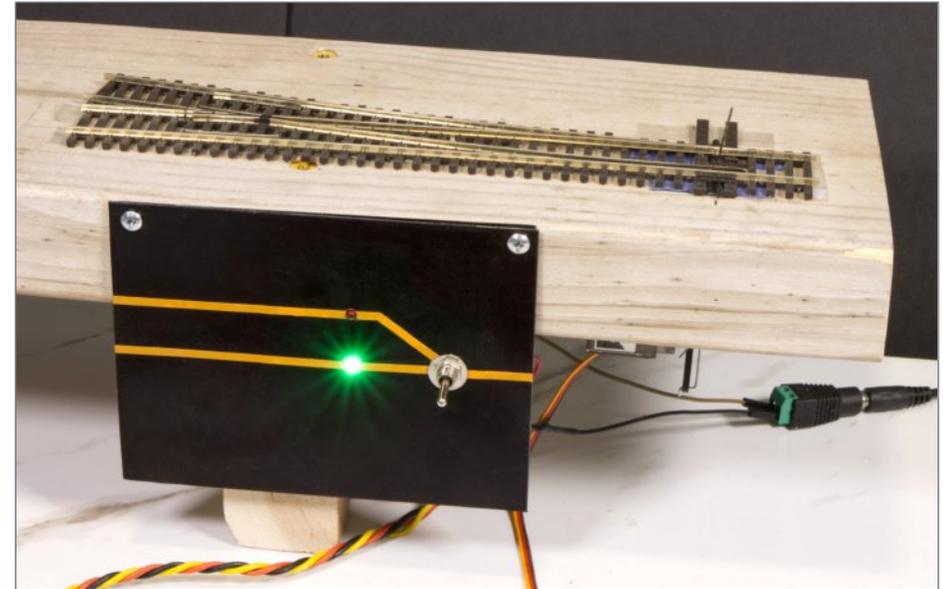
Well, that's it for this series. I hope it's provided you with everything you need to move to less expensive and more flexible turnout control.

With a bit of creativity, it's possible to set up the data table in the layout-ready program to have one toggle throw with two servos, such as for a crossover or wye. You could also put the toggle on a given track of your control panel yard diagram, and have it throw all the turnouts in the yard ladder for that track.

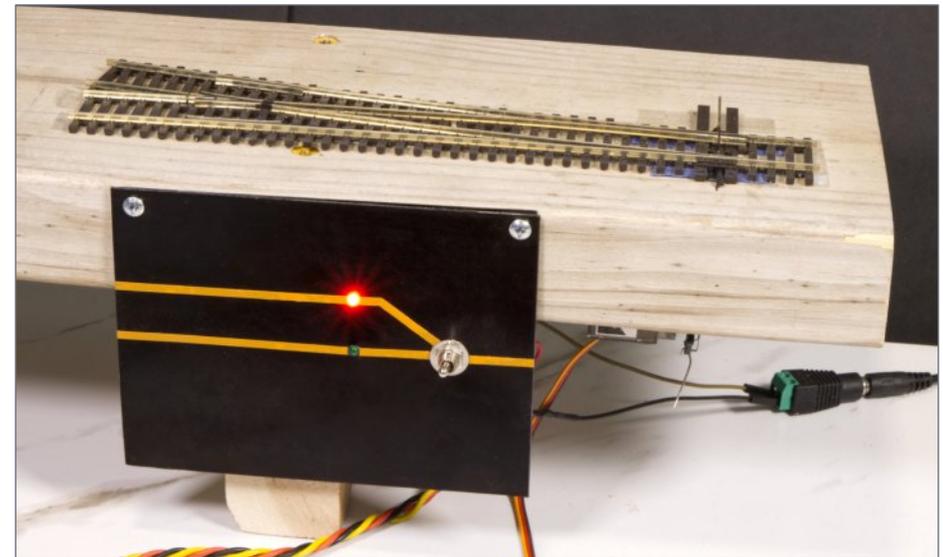
Next month, we're going to discuss making your own twisted cables, but I'm doing that in concert with Peter Randerson, and I consider that to stand alone and not necessarily be part of this series. ✓

To find the shopping list for this article, visit this link: mrhmag.com/magazine/mrh2024-07/elec-impulses-shopping

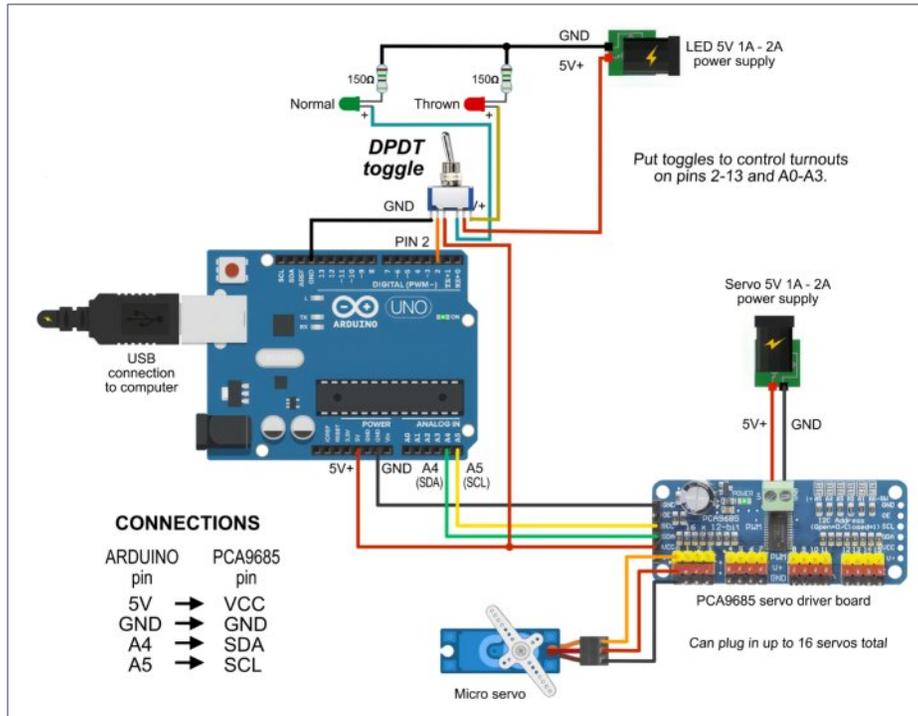
Further pictures on the next pages ...



18. A green LED shows the toggle is thrown to normal.



19. A red LED on the other route to shows the turnout is thrown to diverging.



20. This wiring diagram shows how to add LEDs to indicate turnout throw on your control panel.

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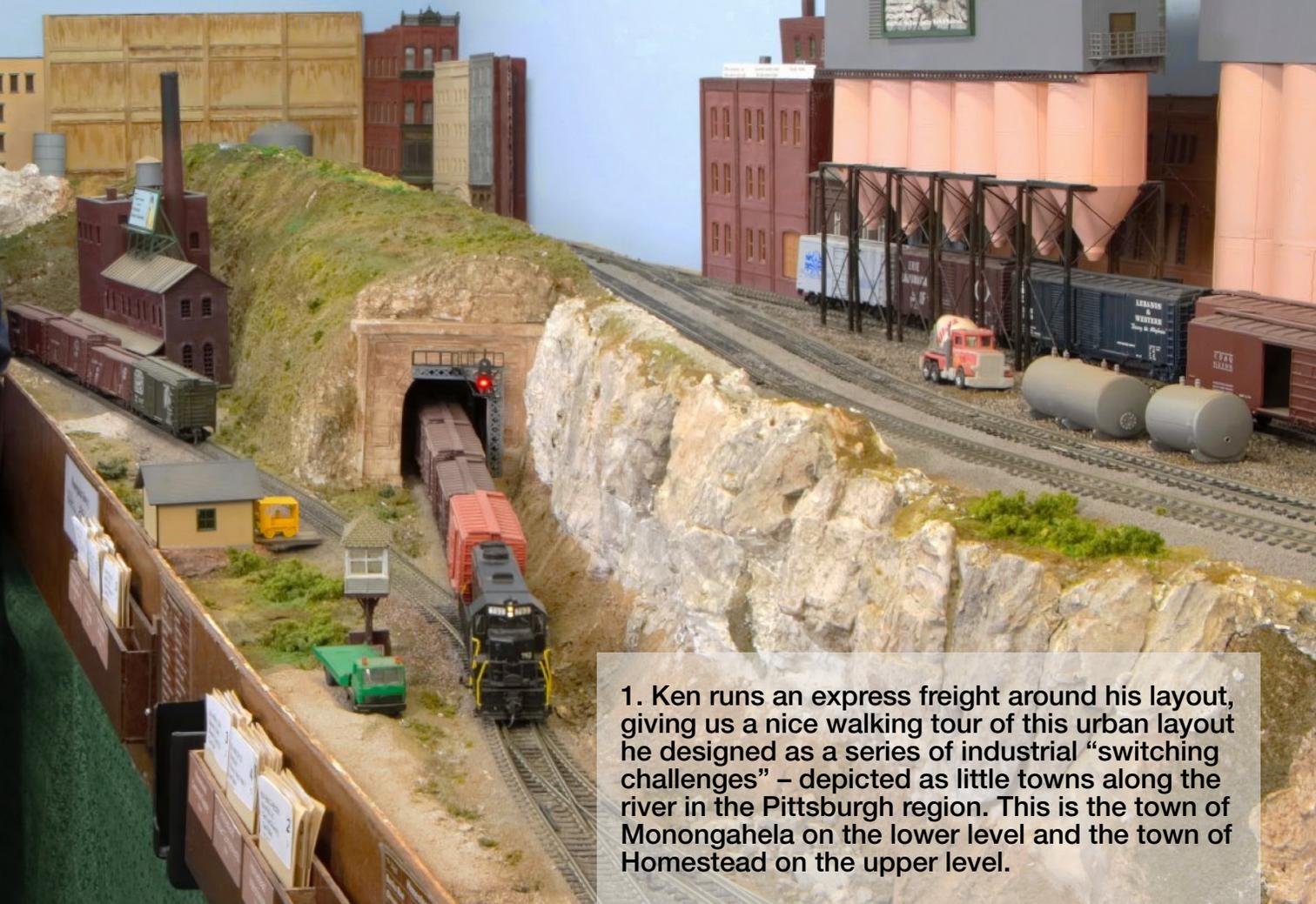
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Ken Hanawalt's Turtle Creek



1. Ken runs an express freight around his layout, giving us a nice walking tour of this urban layout he designed as a series of industrial “switching challenges” – depicted as little towns along the river in the Pittsburgh region. This is the town of Monongahela on the lower level and the town of Homestead on the upper level.

This layout can be viewed at the
2024 Pittsburgh National
Narrow Gauge Convention
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JOE FUGATE VISITS THIS URBAN SWITCHING
LAYOUT ON STEROIDS ...

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KEN HANAWALT'S LAYOUT IN THE GREATER PITTSBURGH AREA will be open for tours during September 2024 as part of the 2024 National Narrow-Gauge Convention. To learn more about this convention and to register, please visit this website: 44nngc.com

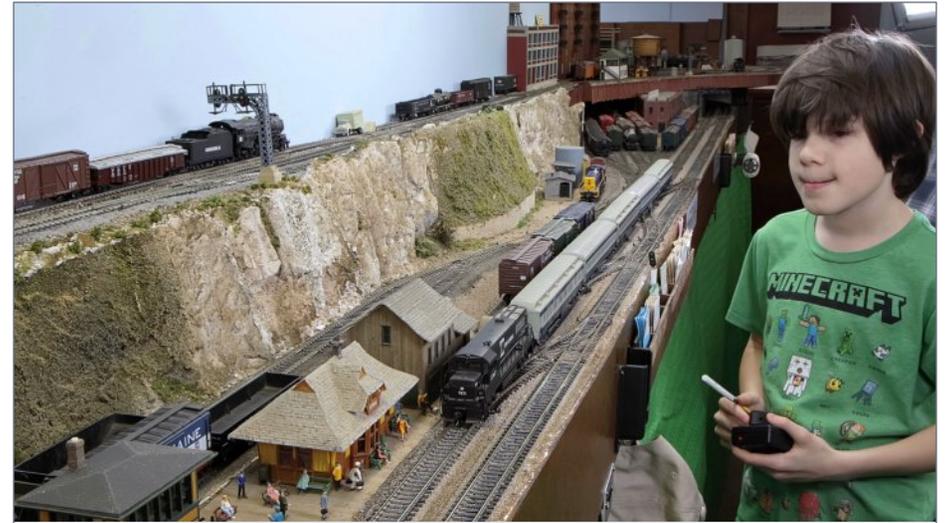
I visited Ken Hanawalt's layout in late February 2024 taking photos and video. I visited with Ken and he gave me a walking tour of his rather unique HO layout.

MRH: Ken, before we get into the details of your layout, tell us more about you. How did you first get started in the hobby?

Ken Hanawalt: I got into the hobby when I was a teenager. There was a man named Jim Burket who lived down the street from me. He helped all the neighborhood guys keep their cars working, and helped all the children with their bicycles.

I was there one day with a bicycle problem, and I noticed on his desk he had a little Pennsylvania railroad 0-4-0 loco with a slope back tender, in HO scale. I asked him about it, and he started telling me about model railroading. In fact, he gave me my first *Railroad Model Craftsman* magazine, which had an article in it on how to build a tower. That tower is on this layout, and we'll get to it later in our tour.

Ever since then I've been inviting the neighborhood children around me to come and see if they can get started in model railroading. It's been a really good experience. I tell them all model railroading is a lifetime hobby. You never get it finished.



2. Ken is big on sharing the hobby with the next generation – here is a local boy, Peter C., who meets with Ken weekly to learn about the hobby. Hooray for Ken! That's the town of Donora on the lower level that Peter is running through – with the town of Munhall Jct on the upper level in the back.

MRH: What about your history of building layouts?

Ken: When I got started, I had just a little bit of space. It was six feet long and two feet wide. What I did was to build switching contests on this little piece of homasote.

At the time, *Railroad Model Craftsman* often had a switching contest article in it. I would build the switching contest, play with it for a couple of months, after which I would make a careful drawing of the layout plan and put it in a notebook.

Then I would take it all apart and build another one. I built dozens of these while I was a teenager.

When I built this layout, they all came back. I now have those switching contests as little towns all around this layout. This layout has 30 towns, with each one basically a little switching contest, one after the other, all around the layout.

When we have operating sessions, our trains run from one of these little towns to the other and switch cars. It takes hours to get all the way around this layout switching the cars with your train.

MRH: How would you describe your goals for this layout?

Ken: I had two objectives for the operation of a layout from the beginning.

One of them was that a person could come to this layout and learn how to operate it in just a few minutes. The second one was that a person who comes to the layout would have the assistance of somebody who had been here before who knew how to operate.



That means that all of our trains are ran by two people: an engineer and a conductor. The engineer would hold the throttle, and move the train around the layout. The conductor would have a deck of cards that told him where to go with the train.

Something that was important for me was that everybody who comes to the layout got started at the same time, and they're able to operate the whole time they're here. That means that there's almost no waiting, and you don't get too many chances to sit down and rest.

MRH: So you use car cards to route the cars?

Ken: In the beginning we used computer-generated waybills, but it didn't take us very long to switch to cards because they were easier to manage. I wanted this layout to be very insensitive to operator error.

If somebody made a mistake, it wouldn't interfere with the operation for somebody else who was running on the same layout. On this layout, if you can't find the card for your layout, it's not a big deal. We just put the car in a box, and sooner or later somebody finds the matching piece.

3. The Turtle Creek is basically an urban layout from one end to the other. The amount of effort that's gone into the hundreds of large structure models on this layout is staggering.

When it does get found, we take it back out of the box, and put it on the layout somewhere. Since there are 900 cars on this layout, we don't run out of cars by taking a few off because somebody's made a mistake with a car!

MRH: What track plan scheme did you use to string all these switching challenges together?

Ken: The way the layout is laid out is a large, folded-over loop, so it's a figure-eight layout.

The upper level is one part of the loop, and the lower level is the other part of the loop. At the back of the room there is a crossover between the two levels. You can either run around on the lower loop, run around on the upper loop, or run the whole way around the layout by switching from one level to the other when you get to the crossover.

MRH: What kind of trains do you run with this scheme? Long trains, short trains, through trains, peddler freights, what?

Ken: I have some shorter trains that just run around the top, or just around the bottom. The train that's sitting next to me here, about to get ready to start, is one that only runs around the bottom.

Originally, we made all of our trains "peddler freights." Those trains visit every town on the layout, and switch several cars at each town. During an operating session, you would switch at least 100 cars, and that takes a long time.

Most of the time you couldn't get all the way around the layout if you're running one of those peddler trains. Later we decided we'd like to have some trains that were shorter. That way, somebody who needed to go home, or somebody who couldn't stand up for three hours could still run a train.

We put together some loads-in and empties-out industries, and some express trains that only switched trailing sidings. We

also set up some coal trains that didn't visit every town, but only visited a few places.

We wanted to make sure that every town you would visit with a peddler train had a possibility to put every car in that train someplace at that town. Every town has at least one interchange track, or one kind of a siding that would take any kind of car.

If you arrived with a stock car and a tank car, you could find some place to put them at that town. In the very beginning, somewhere around 1990, I wrote a computer program that generated a plan for how every car on this layout could be placed. Then I only had 200 cars on the layout, now there's 900, but that program still works.



4. Ken's Turtle Creek is a layout built first and foremost for operation, with a heavy emphasis on switching jobs. Ken uses four-cycle waybills, with different colored envelopes to indicate train type. This is the town of Fayette City on the lower level and Duquesne on the upper level in the back.

MRH: That sounds like some program!

Ken: It was an early “artificial intelligence” type program, and I’m still using the ops method that this program created for me. When you arrive at a town, there is a place for every car in your train that’s supposed to go to that town. There’s never a situation that comes up where there isn’t room to put any car.

Each siding in any town always has the same number of cars on it. The train always has the same number of cars in it, except for the occasional special ones that require special handling.

There is no big staging yard on here. There is a small staging yard that has a few trains in it that are special, but otherwise the staging is scattered all around the layout.



There are three main aisles here, and each one has staging tracks in it where trains are already parked ready to go. When my crews arrive, everybody gets a train, and everyone starts at the same time.

The trains run all during the session and switch cars. Whenever somebody is tired, or wants to go home, there is a staging track nearby where you can drop the train, and leave it for the next time. Generally, we run our operating sessions two days back-to-back, one right after the other.

Next week on Thursday and Friday there will be an op session. On Thursday night when we’re finished running, we let the trains sit, and start back up the next day. Or we can park them on the nearest staging track and leave them for the next day.

MRH: So everyone is road crew and there’s no yardmaster on here?

Ken: Occasionally I get somebody who really wants to be a yardmaster. I have a couple of towns, one called Turtle Creek, that has about eight sidings in it. It can act like a yard, and a yardmaster can be assigned there. And we do have one

5. Ken still has the very first structure he ever built back in his early days in the hobby, this yellow tower. Nice first effort for a newbie – it still holds up after all these years. This tower sits on a spur in Rankin.

friend who really liked to do that, so we would have every train arrive at that town, and the yardmaster would do the switching, and then release the trains to move on.

MRH: I have to say, this is one of the most unique layout designs and op session arrangements we've ever seen.

Ken: It has turned out the layout is a lot more flexible than we thought it was. A year ago we started trying to produce a diagram of how all the trains ran. We were surprised to discover we had the flexibility to run a combination of express trains, a passenger train, and various kinds of freight trains all at the same time.

MRH: How did you get all that to fit into this space?

Ken: This layout is in the basement of a ranch-style house. The railroad takes all the space except the garage and one little workspace that's behind it.



6. Ken likes to inject some humor into many of his business names, like this one: *Mine Safety Prevention Co.* Also note the Snappy Turtle signs around the layout, after the spirit of the Burma Shave roadside signs.



7. Many of the industry spurs go into buildings, allowing Ken to add more depth to the structures and still have lots of industry car capacity. In several cases, Ken also has hidden staging tracks running through a continuous row of buildings. This is the town of Monessen on the lower level.

The main layout room is about 25 feet wide and about 30 feet long at the longest stretch, and about 20 feet at the shortest stretch. The layout has three main aisles, and each layout shelf on each side of the aisle is about two feet wide. It's two feet wide because you can easily reach all the way across from the aisle.

All the turnouts on this layout are manual. There's no control panels with toggles on them. We like to focus on the layout rather than on a control panel, and this works because the layout

is all reachable. There is a stairway that comes down the middle that makes the space bit wider than it seems from the aisles.

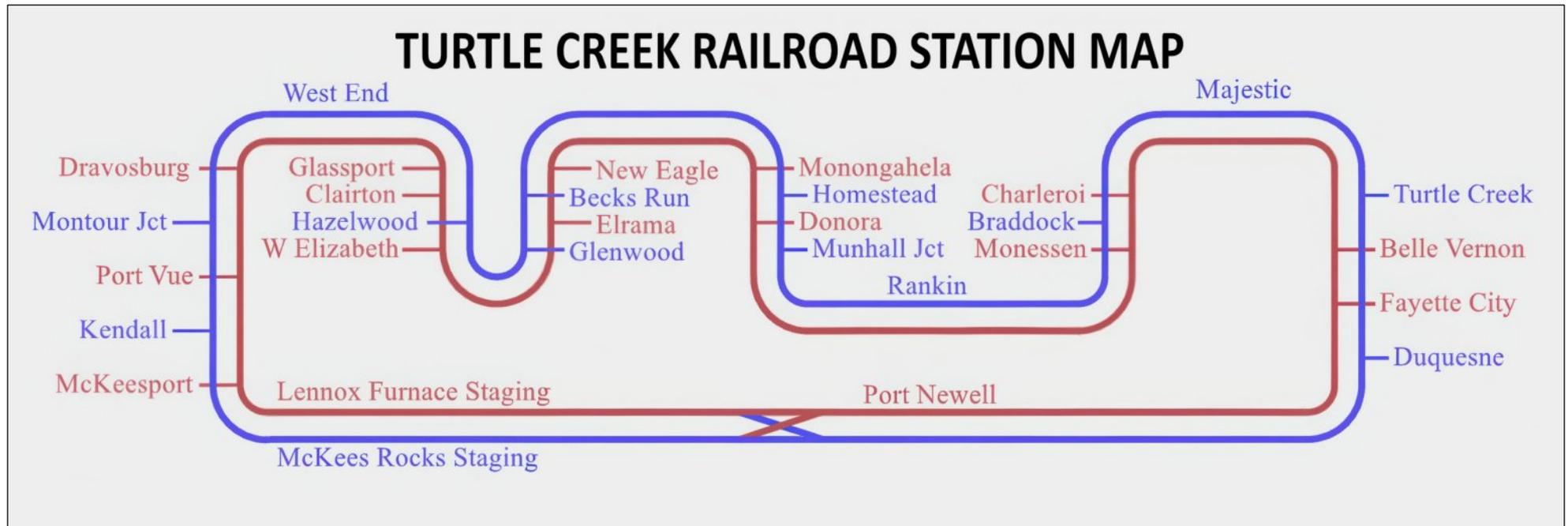
The height of the lower level is 50 inches. Originally it was 55 inches, but we lowered it a little bit when we moved here because my second spouse is not as tall as my first spouse. Consequently, for the lower level it is 50 inches, and the upper level is 55 inches.

I tease everyone that I'm the dumbest one here, but I figure if they understand I have been choosing some smarter people to come operate, they should eventually understand exactly how to run the railroad.

MRH: Why model the Pittsburgh area and not somewhere else? And why the name Turtle Creek?

Ken: When I first came to the Pittsburgh area, I was really impressed when I went downtown, and looked at the scenery down there. All the trains seemed to be running right on the roofs of the buildings on the lower level because of the steep hills in Pittsburgh.

So when you look at my layout, that's the way it looks here. I built it only five inches high between the two levels so that the trains on the second level would look like they were right behind the roofs of the buildings on the first level. In fact, I saw a picture in the newspaper not too long ago of a car (auto) that had gone off the road on the second level and landed smack on the roof of a car on the lower level.



8. The Turtle Creek layout schematic.

I named this the Turtle Creek Railroad because the layout has trains coming down off the mountain between Altoona and Johnstown towards Pittsburgh, ending at Turtle Creek.

We imagined that this is a branch line of the Pennsylvania Railroad – or some other big railroad – before the horseshoe curve was built. Then when I had to move the layout here after about 12 years, we decided to make the railroad go down the river.

So now in our imagination, it starts at McKees Rocks, a little bit north of Pittsburgh, goes down the Monga River past all the little towns on both sides, and ends up at a car ferry outside of California, Pennsylvania at a place called Newell.

There wasn't actually a car ferry at Newell, but there was a automobile car ferry at Newell. We decided a railroad car ferry would be more interesting.

The way this layout generally works is: you start at McKees Rocks, which is on the upper level. Then the line follows the towns along the river. When you're operating this layout, you're standing in the water, and you're always facing north when you face the layout. The trains to your right are going east, and the trains to your left are going west.

The peddler trains mostly run in one direction: to the east. We figure we're doing that in the morning. Then in the evening, when nobody's here, the trains run the other direction. The little farm that I had south of here was on a branch line, and all the trains in the morning ran to the south, and all the trains in the evening ran back at night. That seemed like a good way to do it.

As we added more trains to the run, we found it fun to have a few meets, but not too many because we didn't want operators to spend a lot of time waiting. So we have a few shorter trains that run in the opposite direction and cause a little bit of congestion every once in a while.

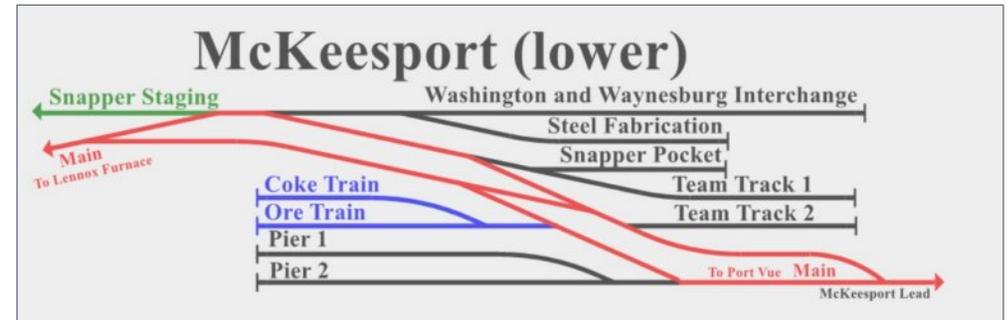
The towns starting at the north and running down the river are not models of the actual towns on the river. This is a freelance

layout. We imagine that it is a major branch of some more important railroad like the Pennsylvania Railroad, or the B&O Railroad that also ran in this same area.

WALKING TOUR OF THE TURTLE CREEK

From here on, Ken gives us a walking tour of the Turtle Creek, so take it away, Ken!

MCKEESPORT



9. Track schematic of McKeesport on the lower level.

To start out this walking tour, let's run a Turtle Creek train in the town of McKeesport. Here's the track layout of McKeesport [9]. Each one of the towns on the layout has a little map that shows you where the sidings are at that town, and what the names of the industries are.

We have a steel mill here in McKeesport [10] that gets deliveries of coal and coke from other trains that come by. The background here is our Snapper Express train, which is going to run past the "yard" here to the upper right. This "yard" has general industry and staging tracks switched by other trains that go by.

When you're running a train like this, you get a deck of car cards. The first card gives you general instructions about how to run the train [11]. This tells us where the train is staged, and it has general instructions on what to do. For example, the first one that says we're running this train east. On this railroad, east is always to your right.



10. We start the walking tour of the Turtle Creek here at the McKreesport, home to a Steel Mill. To the left of the photo in the back is a small layout staging yard.

The cards for the train may be in a different colored envelope, depending on the kind of train it is. This is an express train, and it uses a green envelope.

I generated the cards here with a computer program that I wrote, and there is a card for each car. It tells you on the card what kind of car it is: like it's a boxcar. It tells you the road name for the car, MCR in this case, and it gives you the car number.

It also tells you where that car is supposed to go. This particular car is supposed to go to Belle Vernon. It tells you the name of the train, the Snapper Express train, and it tells you which way it's going. We're going east with the Snapper Train.

If we were going to switch this car, we would take a look at the cards, and see what cars we have to deliver to the next town we're going to come to. It turns out that we have three cards in this train for the very next town, which is called Port Vue.

If I were running this train, I would start my engine up, and drive it down to the next town. The cards are in the same order that the cars are in the train, so these three cars at the back are the cars that we're going to drop off at the next town, Port Vue. We deliberately set this train up to make it easy for somebody who's just starting.

All of the cars get switched into trailing sidings, which means that we can simply back the cars into them. We don't have to run around them. All the cars that we pick up come from that same siding where we drop these, and that means they are always the same number of cars on the siding.

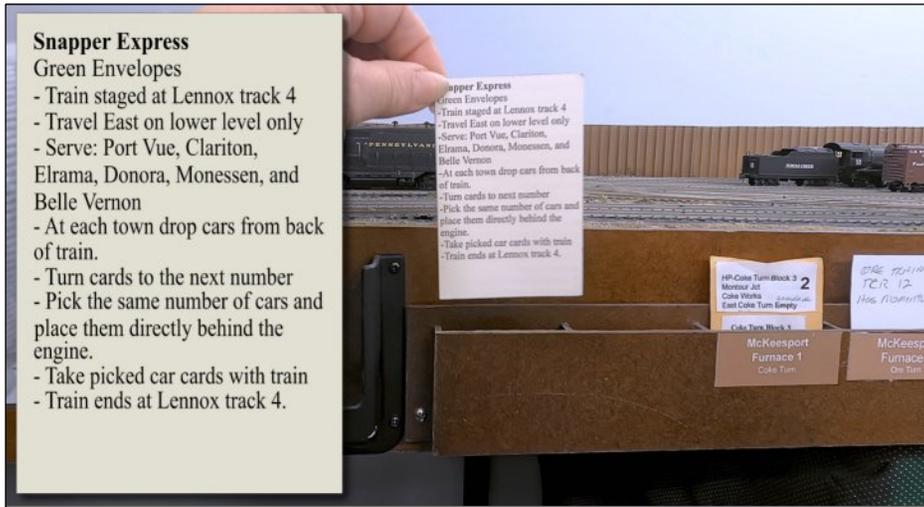
I'm going to run the train down to Port Vue, and we'll have a look at how that goes. All of the switches on this layout are hand-throws because again, we like to watch the action on the layout, not at stare at control panels.

At each town, there is a box for each of the industries that are at that town, and they're labeled with the name of the industry. We can figure out pretty easily where we're supposed by looking at the cars we drop at each town.

This is a fairly long train. Most of our trains are short, but this train is long because we kept it easy to run. It's all trailing spurs, so that makes it easy to drop the cars. The three cars that we're going to drop at the first town are the three cars in the very back.

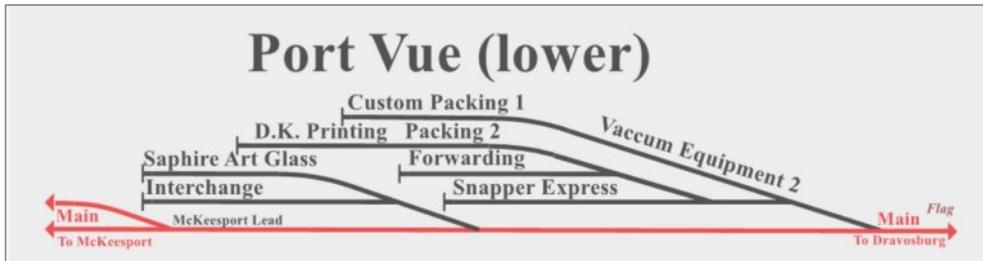
The first car to drop is the Westminster Southern which is a freelanced local layout, the next car after is a Virginian, which is a prototype railroad. The next car is a Wabash, another prototype road. Also, at most of the towns, we have a holder where you can put your throttle to get it out of the way.





11. We're following the Snapper Express – this is the instruction card for this train.

PORT VUE



12. Track schematic of Port Vue on the lower level.

The next town down the river from McKeesport is Port Vue. I like Port Vue because of the little printing supply company. My son works for a company that does printing, and his name is David K, so we named the industry after him. The nice thing about this printing company is the size of it. It's so big that it has to have the ink delivered in a covered hopper.

As we go along, you'll see a number of other industries named after friends and family members.

At each town, there's a little box on the fascia that doesn't have a label. This is where you can put the cards that you aren't going to deal with, so you only have to hold the ones that you want to switch. These last three cars all go to the Snapper Express track, and it turns out that's easy to find because their cards are green.

I added a little shelf behind the card box. This lets you arrange the cards behind the slot where you're going to put the car, and that makes it very easy to remind yourself what you need to do as you switch. That little shelf holds the cards up there, and I can look to see that I've got these three cars, and that they're going to go in this box for the Snapper Express track.

Now I need to find where the Snapper Express track is. I look at the map [12], it's this track here, and it turns out there's three cars on that track. So I pull the train forward far enough that I can cut the three cars off the back of the train. Then I will exchange them for the three cars that are sitting on the siding.

I carry a pencil with me and I just use it to uncouple with. I pull forward and grab those three cars and stick them on the caboose, and then go back to the siding and drop off the other three cars.

Now after I drop the cars, I take the three cards for them and I turn the card to the next number. It says three now. I find the four and I put the four up instead. Now those cars are ready for the next train to move those cars wherever they're supposed to go.

We don't have control panels on this layout, so all the turnouts have to be thrown by hand. We did that because we prefer to interact with the layout rather than with an electronic board.

We designed this express train to be easier to switch than some of our others. A beginner who gets this train finds that it is not hard to run. What makes it easier is we set it to switch just trailing spurs with no runaround needed.

Now that we have swapped the three cars between the train and the siding, we take the cards for the three cars out of the box where they were located and note where they say they're going next.



13. Ken sorts through the Snapper Express cards to find the cars to be dropped here in Port Vue (turns out it's the last three cars). Take note of our long train along the fascia. Not visible to the left are four more cars and a caboose, so this is one good-sized train.



13a. At Port Vue, we swap the three last cars in the train with the three cars on the Snapper Express siding.

When we get to those places, we may have more switching to do. All the switching needed for these trains comes from a computer program that I wrote years ago. It guarantees there will always be room on the spur for the cars that you're supposed to drop.

However, the cars that are pick-ups are only there if the person ahead of you did the right thing. Sometimes there's mistakes, but this layout is very insensitive to errors like that. Most of the time it's easy to resolve one of those mistakes, and a person need not to worry about causing trouble anywhere else.

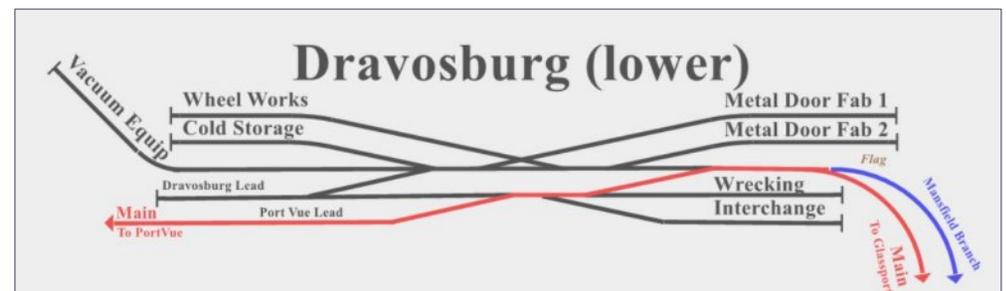
I like that we cannot run out of cars to switch on this layout, because every car is always ready to be picked up and moved to the next place all the time. The layout can run continuously, and you never run out of something to do.

Finally, we connect the train back to the three cars we hooked to the caboose, and we're ready to move to the next town.

That's how the Snapper Express works on this layout. There's only one express train like this and it's a nice long train. It drops groups of cars at various towns, always with trailing sidings, only on the lower level.

Notice this train will block other trains of course, because it's longer than a town. But there's only one train like this, and it runs just on the lower level. We give this train higher priority than the other trains. So, when this train is coming, the dispatcher will warn you to make room for it.

DRAVOSBURG



14. Track schematic of Dravosburg on the lower level.

The next town down the river here is Dravosburg with the “famous” company Gordon Wheel Works. Gordon is one of my friends who’s a big-wheel in whatever it is he does.

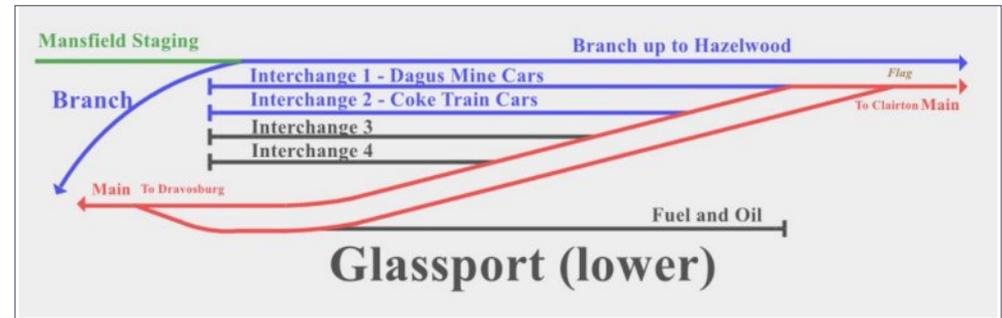
One of the features of this layout is that a lot of the sidings are inside buildings. That way we get the most track for the space we have available. Both the metal door fabrication, the Gordon Wheel works, and Vacuum Equipment have cars inside their buildings. I saw that in Pittsburgh when I first came here.



14a. The Gordon Wheel Works spur track goes into the building. Many of the industry tracks go into the buildings, providing more space for structure depth, while also allowing for lots of car capacity at the industries.



GLASSPORT



15. Track schematic of Glassport on the lower level.

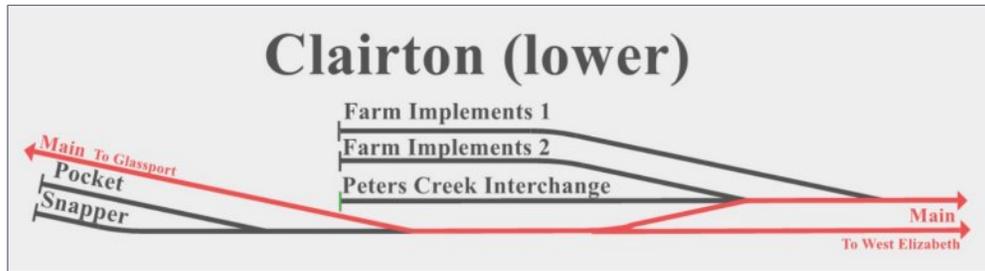
The next town down the river is Glassport. It has tracks for the coal loads that have come down from the coal tippie, and we have empty coke cars that are going to go up to our coke plant. We also leave an engine sitting in the tunnel on the branch line – it’s really a staging track ready with a train to come out and run.

There’s a grade up behind those coal cars, and it comes all the way up behind the next town. It comes out up at the coal tipples at both ends of this aisle, and it’s one of the places where you can get a train from one level to the other.



16. At Glassport a staged train sits in the tunnel, ready to enter the layout.

CLAIRTON



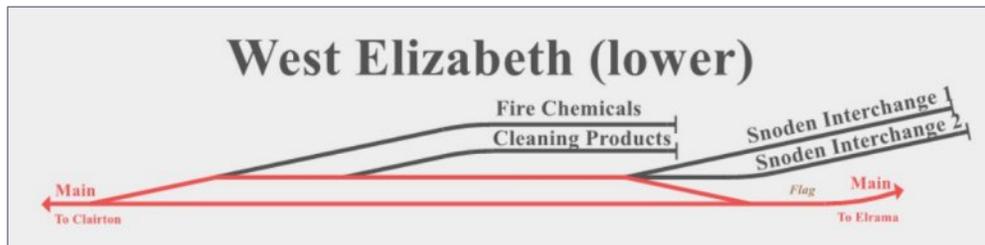
17. Track schematic of Clairton on the lower level.

The next town down the river, is the town of Clairton. At this town we have one of our engine pockets, which is where we put the engine that's going to carry the empties up to the coal mine on the second level.

It runs on the branch at Glassport. That train is also used for taking cars up to the coke plant. In this town we have three cars sitting at Peter's creek exchange that go in the express train that we're running right now – Snapper Express cars.

We also have some farm implements industry tracks in this town.

WEST ELIZABETH



18. Track schematic of West Elizabeth on the lower level.

The town of West Elizabeth comes next down the river. You'll notice that there's a stream that comes in here under the bridge,

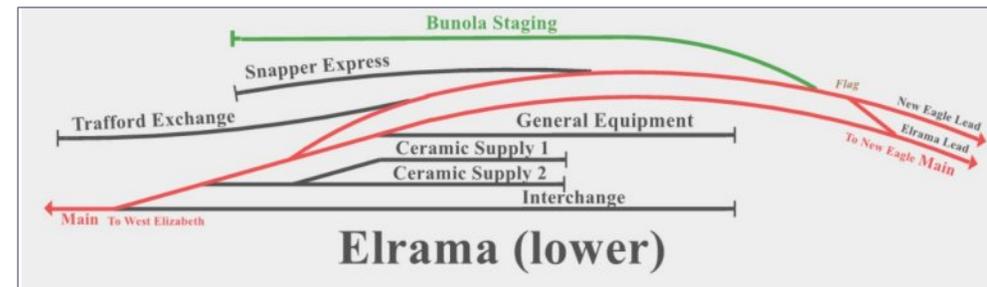
which is a pristine place for catching fish [19] as long as you don't mind being poisoned.

Here we have an interchange that goes off under the culvert goes right under the coal mine. That's because our friend Jim Ferguson, who has a railroad over in Upper St. Clair, didn't mind at all if the coal mine took the coal right out of his cars while they were parked in the tunnel!



19. The "fishing spot" at West Elizabeth. You eat any fish caught here at your own risk!

ELRAMA

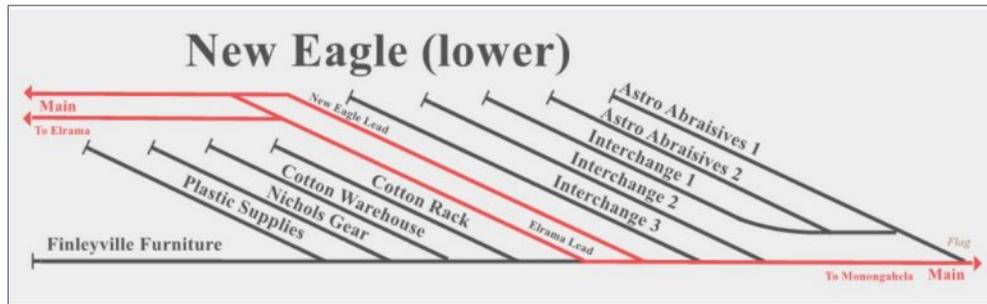


20. Track schematic of Elrama on the lower level.

The next town on this tour of the river is the town of Elrama. At this town our favorite industry is the ceramic supply of Cannonsburg.

The sign here in front of it is the advertisement that says, "Let mad pursuit and attic shape your own sweet melodies unheard, and marble maidens struggle to escape ceramics made in Canonsburg." The real author of the Ode to the Grecian Urn probably wouldn't care for it.

NEW EAGLE



21. Track schematic of New Eagle on the lower level.

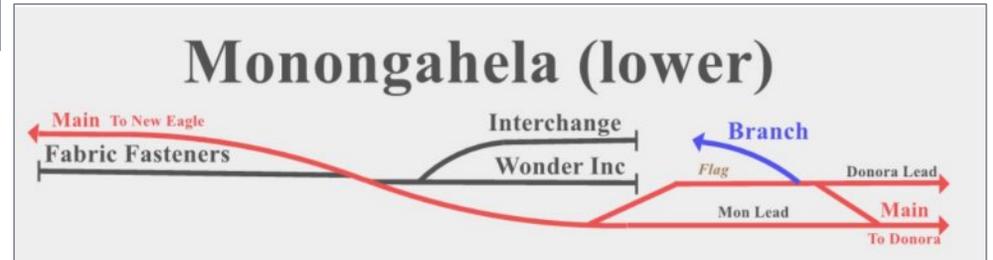
The next town down on our tour of the river is New Eagle. New Eagle is well known as home of the Astro Abrasives Company. I named it Astro Abrasives [22] because I have been interested in astronomy for a long time.

Underneath the layout here is a really nice five-inch Schmidt-Cassegrain telescope that I have used to gaze at the stars when I wasn't building model railroad cars.



22. Our train rolls through New Eagle with the Astro Adhesives company looming in the background.

MONONGAHELA

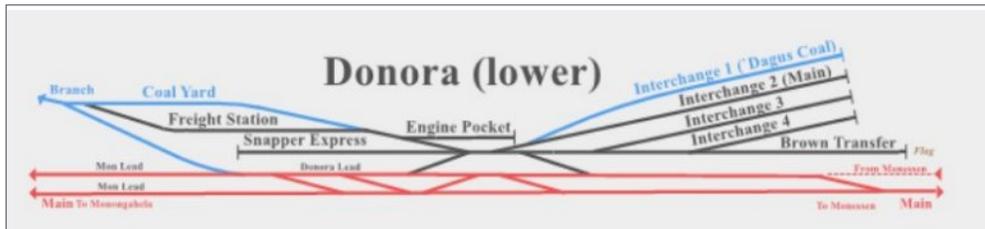


23. Track schematic of Monongahela on the lower level.

The next town on the river is the town of Monongahela, which has the world's biggest button factory located on it, Fabric Fasteners of Finleyville. The sign on the top has an important message for people: "avoid button failure, use only fabric fasteners."



DONORA



24. Track schematic of Donora on the lower level.

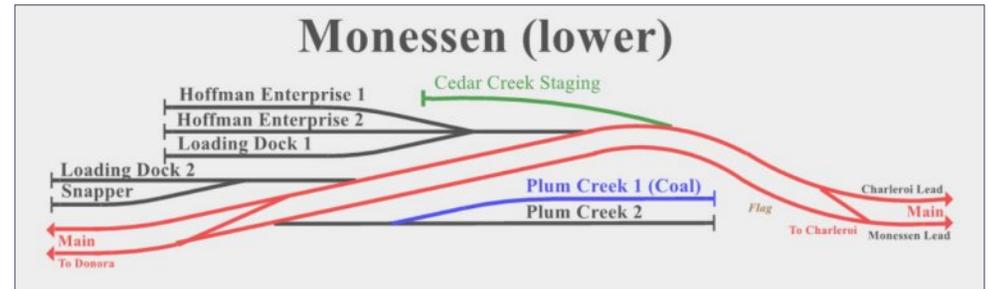
Next town down river is the town of Donora. Donora has a nice little scratchbuilt station that I got from one of the magazines years ago [2, 25]. It's one of the few places on the layout with a yard where we can do a little yard switching if we want to.

Donora is also the end of the branch that runs through a tunnel up to the power station [25]. One of the trains we run takes a load of coal out of the yard in the back, and pulls it up to the power station. There the train exchanges coal for empties at the top of the grade.



25. Our trains rolls past the scratchbuilt station at Donora. In the distance you can see the tunnel going up the branch to the power station.

MONESSEN



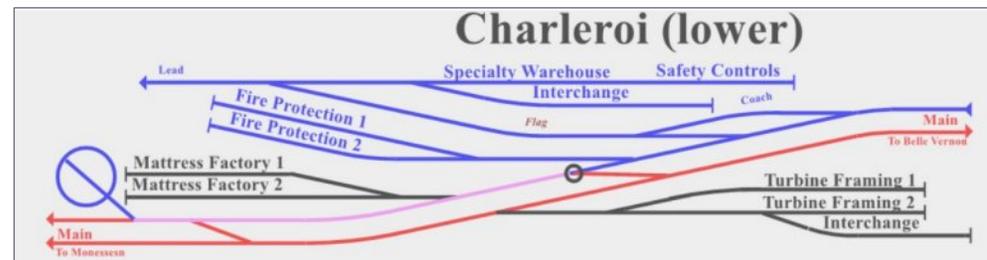
26. Track schematic of Monessen on the lower level.

The next town on our trip is Monessen. This town is known for the building in the back, which we call Hoffman Enterprises [3]. It's the big gray building along the back with the brick building in front of it. This structure was built by one of my friends who was in a wheelchair at the time – a pretty amazing achievement.

The little creek in the front and the wooden piers that are in front of it were put together by another one of my friends, who is a retired dentist.

Cedar Creek staging is hidden inside the Hoffman Enterprise building, and can be one of the places where an operator starts with a train when people come for a session.

CHARLEROI



27. Track schematic of Charleroi on the lower level.

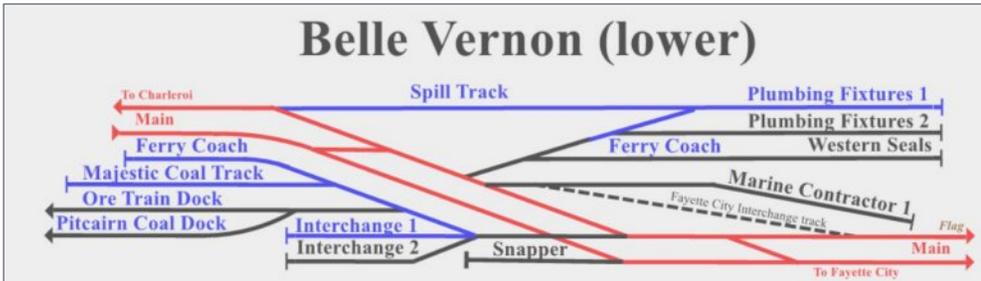
This is the town of Charleroi down the river, and this town has a freight station tower in it [28]. The tower built on the top was one that I modeled based on one actually located in McKeesport when I first came to Pittsburgh.

I scratchbuilt this station. I studied photographs and drawings that were made at the time the station was built in McKeesport. It is was a nice project for me before the days when you could do 3D cad on a computer.



28. Our train rolls through Charleroi. Behind the locomotive is a somewhat unique tower freight station modeled after an actual Pittsburgh area station.

BELLE VERNON



29. Track schematic of Belle Vernon on the lower level.

This is the town of Belle Vernon. We're almost at the end of the layout, and the train is coming out of the tunnel here.

Belle Vernon is one of our busiest towns because it not only has a small yard in the back, it also is the midpoint of the ferry train. We also have a coal transfer that comes out of this town, as well as the coal mine dropping off cars here at the end of its run. While Belle Vernon is a busy town, it's not a very big one.

Many different kinds of trains can arrive here [30]. The blue cards are the coal cars from the coal mine at the next level. The red cards are cards for the ferry train, which we'll see soon. When we get to the port, the green cards are for the express train, the train we're running.

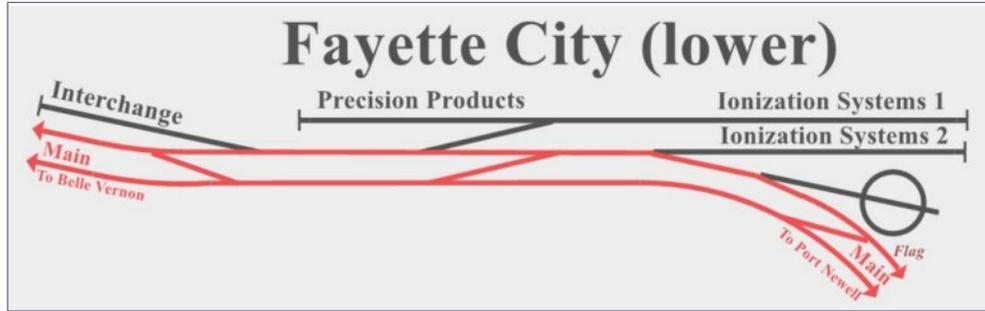
The yellow cards are the Peddler Freights that come through here. All four kinds of trains go through this town.



30. Our train rolls into Belle Vernon, one of the busier towns on the Turtle Creek. Note the car cards along the fascia and the variety of envelope colors, indicating all the different kinds of trains that can arrive here.



FAYETTE CITY



31. Track schematic of Fayette City on the lower level.

This next town of Fayette City [4] has one of the few places where the track is a little more complicated and involves using switchback to work the town.

A switching train coming through may need pull facing-spur cars, and maneuver cars around to get to the trailing industry of Precision Products.

Other than that, this is a pretty simple town. It only has three spurs. It has two behind and one in front. And most of the time the trains roll right through this town without much delay.

PORT NEWELL



32. Track schematic of Port Newell on the lower level.

The last town down the river is Port Newell. At Port Newell, we have a car ferry that brings cars in from other places on the railroad. There's a special train that starts at the port ferry and runs up the branch line at Donora.

It takes cars off the ferry and delivers them to various places in Port Newell, then makes up a train that then visits a couple other towns on its way to the branch. This train has the least priority of any other train, and so a mainline train coming through here is always in the way of somebody trying to work the ferry.

The station has a passenger car in front of it that the CEO's daughter uses to host a party when she's riding on the train.

They have to be very careful when they're switching this passenger car because we don't want to upset the teacups. That passenger car is always parked at a passenger station when the ferry train is doing its switching at the other towns.

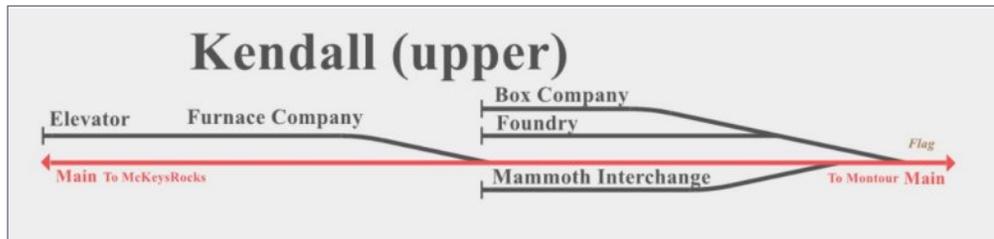
This town also has the engine facility. We have a turntable and a roundhouse back here and a coaling tower, plus some other industries in this town.



33. Our train (in the back) rolls past the Port Newell car ferry, enginehouse, and station.

This town can get busy – some of the cars coming off the ferry carry coal, take away ashes, and deliver oil for the engines at this town.

KENDALL



34. Track schematic of Kendall on the upper level.

All the trains started in the staging yard, so if we were going to run an upper-level train, we pull out one of the trains from the staging yard there, and run it up the grade. When it gets up this grade, our northernmost town on the layout is the town of Kendall, which is north of Pittsburgh.

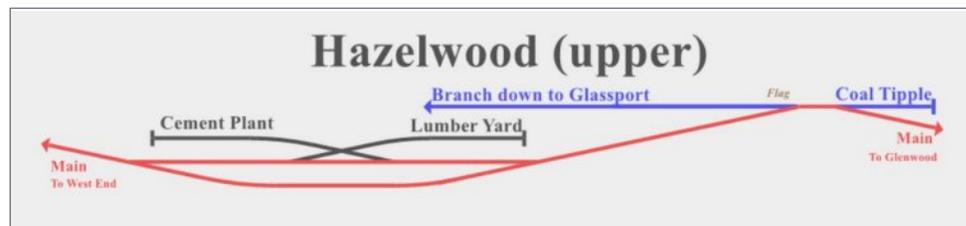
Kendall has some mills, a furnace company, and a couple of other interesting places. The mainline trains switch Equine Adhesives (“Box Company”). My wife liked horses, and the stainless cloth fence made lots of fences because of the horses.

Here is our coke plant (“Foundry”), which takes some of the cars from our coal tipples and turns it into coke for the steel mill down the hill.

Here is our connection to one of the northern industrial railroads that we serve via Mammoth Interchange.



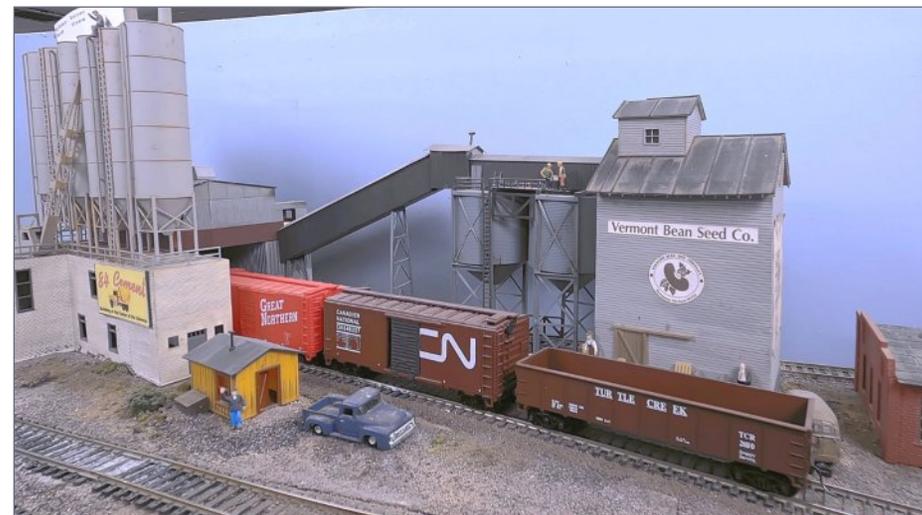
HAZELWOOD



35. Track schematic of Hazelwood on the upper level.

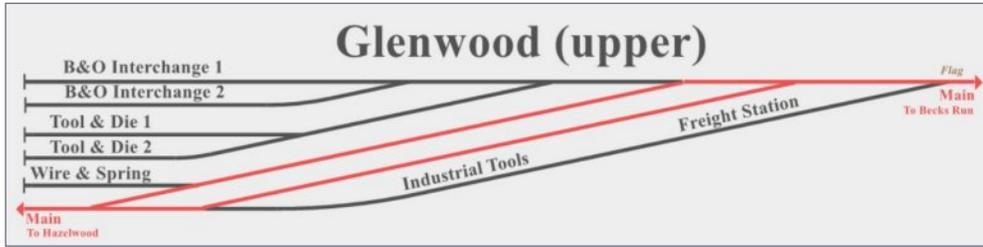
When we started building this next town down, we used to call it 84 PA, because that's where I lived, but now we call it Hazelwood. It has a cement plant and it has a lumberyard, and Vermont Bean, which was featured in one of the magazines years ago. I built Vermont Bean when I was a teenager.

Here we also have another coal mine. This one produces the coal that's used to make coke in the coke plant.



36. Hazelwood is home to the Vermont Bean Company, a structure Ken built as a teenager.

GLENWOOD

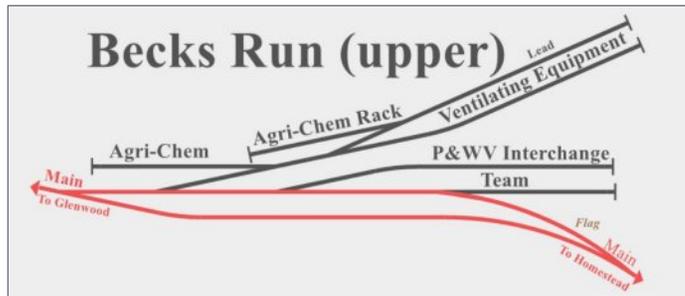


37. Track schematic of Glenwood on the upper level.

This next town is Glenwood in the upper level. We have a fair number of tracks here that we can switch cars to. The first one is Ferguson Precision Millwork and next to it we have a station kit.

One of our trains carries loaded coal cars up here and puts them in this side of the power plant (off to the right of the track diagram and not depicted), which connects to the coal mine on the other side. So these are loads-in and empties-out. Those empties sitting here are ready to come back from the power plant to a yard down below that we'll get to in a few minutes.

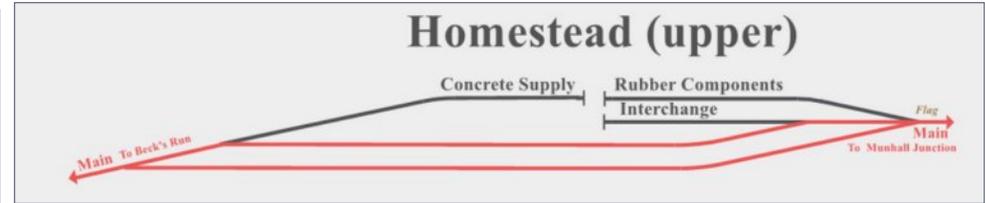
BECKS RUN



38. Track schematic of Becks Run on the upper level.

The next town over is called Becks Run. The main industry at this town is the Agri-Chem factory which produces agricultural chemicals. This was modeled on an actual chemical company located near my farm at 84 PA. We also have some additional industries to fill out this farm town.

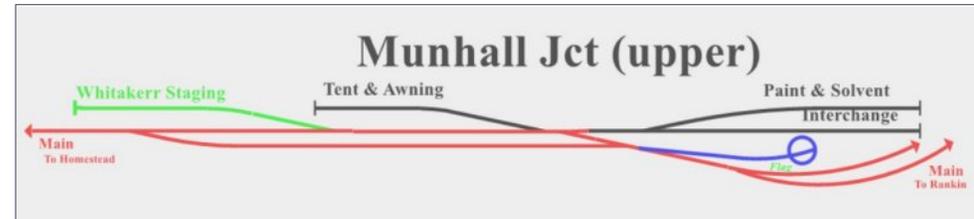
HOMESTEAD



39. Track schematic of Homestead on the upper level.

The next town on the upper level is Homestead [1], which is producing concrete for dams and roads and whatever else.

MUNHALL JCT.



40. Track schematic of Munhall Jct on the upper level.

The next town over here is called Munhall Junction.

On the left is Whitaker Staging, which has a staged train ready to go. If you come to an operating session and wanted a Peddler Freight, this could be one of the trains that you would get. If you choose to run this train, it would start here and end here, and as I've mentioned, all operators start at the same time.

Munhall Junction is a small town with a turntable and a couple sidings [40a]. This turntable is important because the coal train that comes out of the town that we're going to get to shortly comes around on the lower level. Then it switches some cars there, goes into the tunnel up to the upper level to the power plant, and then comes down.

Then the engine is turned on this table, and it proceeds east to go back to the power plant in the next aisle.



40a. Munhall Junction has turntable that used to turn engines that end their run here. You can also see some of the spurs in Rankin, the next town over behind the turntable. That yellow tower in the distance is the first structure Ken ever built when he first got into the hobby [5].

RANKIN



41. Track schematic of Rankin on the upper level.

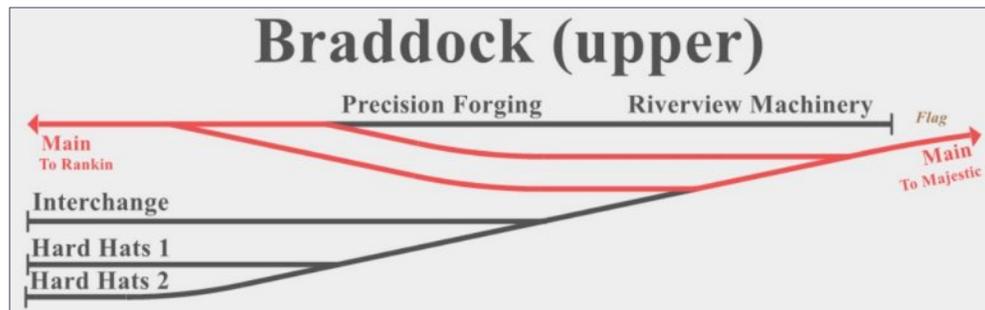
Just around the corner is the town of Rankin. Rankin has this nice long building in the back with lots of windows in it. This is a kitbash of one of Jimmy Sacco's structures. Jimmy made a lot of City Classic models that were based on things he saw in Pittsburgh. I don't know how many kits are in there, but there's more than one used to make this industrial park here.

Jim Ferguson has a superhero who's in charge of watching the trains on his layout. He has allowed us to have this superhero's cousin stand on top of Jimmy Sacco's building there.



42. This view of Rankin shows the prominent long Sacco Supply building. The yellow arrow on the upper mid-right points out the superhero on loan who is watching over the railroad.

BRADDOCK



43. Track schematic of Braddock on the upper level.

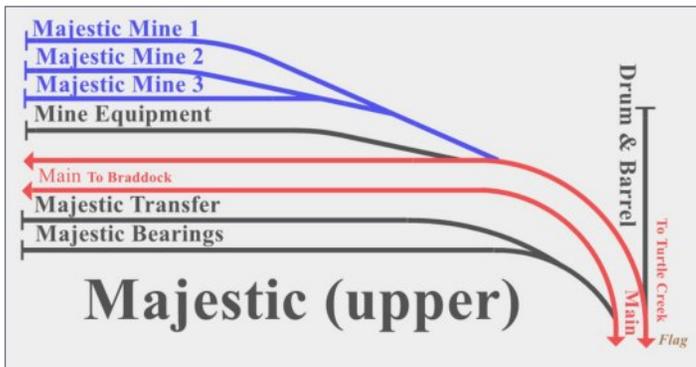
We come around the corner into another aisle. The trains go behind these buildings on the lower level and arrive at Braddock on the upper level [44]. Here there's something a little out of scale. This is the only thing we have left from the N scale layout that Carl White and I once had, which ended up in a dumpster one day when we weren't looking.





44. In the back is Braddock on the upper level. Can you spot the N scale structure that's trying to be an HO building?

MAJESTIC



44a. Track schematic of Majestic on the upper level.

Here at Majestic is the large coal plant that serves most of our coal tracks around the layout. It's the one whose engine gets turned on that turntable in Munhall Junction, and then comes back to this place. It starts out with about 20 loads in the plant – and when it gets back here, it has 20 empties that go under the tower.

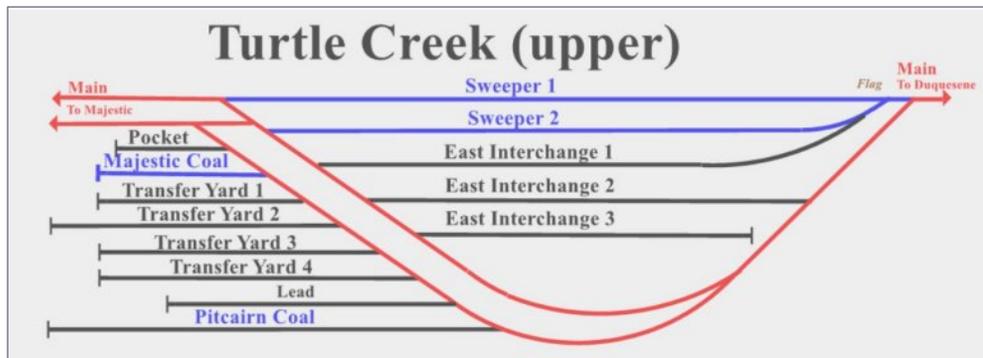
We use a magnet to remove the loads and to later put them back in the cars again for the next run.





44b. The massive coal mine at Majestic.

TURTLE CREEK



45. Track schematic of Turtle Creek on the upper level.

And then we have the namesake for this layout, our town of Turtle Creek. This is where we use a yard master and home to our biggest yard. We park a train in the front here with a lot of Turtle Creek cars in it is one of our unit trains that we run when somebody wants an easy and quick train that lets you see the whole layout.

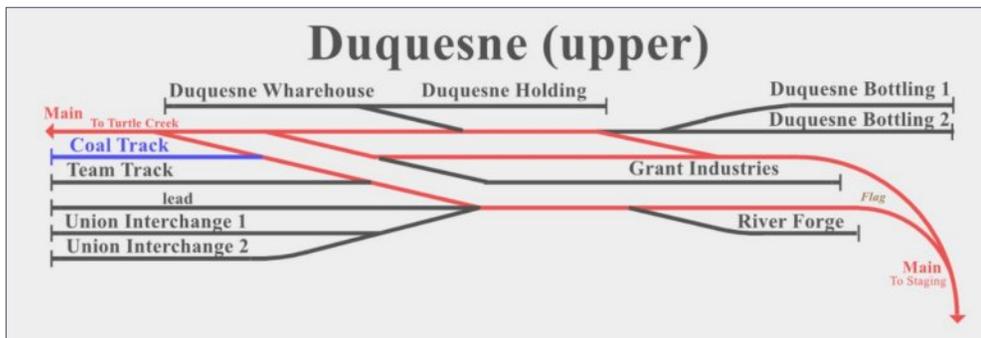
If you run this train you get to see every town on the layout, and you can do it in about 30 minutes.

There's also this interesting structure built by Tom Hornmeyer. It's a Goo factory [30 upper right]. Remember Walthers Goo from years ago in Model Railroader? I think it's an interesting factory, and one of these days I'm going to figure out how it works.



46. Here's the namesake town of Turtle Creek. It has the largest yard on the layout, and that train in the front is a unit train that will tour the entire layout for anyone who operates it.

DUQUESNE



47. Track schematic of Duquesne on the upper level.

And then we have the final town on the layout. This is Duquesne on the upper level. It's mostly switching and transfer. It has a passing track in it, which you can find if you look carefully. It is the final track before you get back to the crossover that gets you to the lower level. That is the whole layout. ☑





48. Here's the final town on the layout, Duquesne, on the upper level in the back, with Fayette City on the lower level in the front. You can see another view of Duquesne in [4].

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3D Printing the steam throttle and complex builds



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Model Railroad Hobbyist | July 2024

DR. GEOFF BUNZA OFFERS TIPS AND TRICKS TO 3D PRINT THE STEAM THROTTLE...



I HAD NO EXPERIENCE AT WITH 3D PRINTING BEFORE BECOMING involved with the Amigos' Steam Throttle project, ("An Operating Steam Throttle You Can Customize" two-part article in May and June 2023 *MRH-Running Extra*). I was on a very steep learning curve when I printed my very first 3D parts.

I thought I would share my 3D impressions with you because I have only one shot, and they might matter to others considering 3D printing. I will also add some other comments about building the steam throttle that may prove helpful.

For over 40 years I was aware of using caps and appliques for momentary and push-on-push-off push buttons. When I saw these "handles" used, I was eager to try 3D-printing these small parts. I thought that they were an easy mark, and I could use them in many ways.

Dave Merrill designed all the steam throttle 3D parts. His persistence and skill yielded more test variations than I can shake a stick at! We wound up with a steam loco boiler backhead that was fun to hold and operate.

I finally borrowed my son's 3D printer, a MakerGear M2 printer, to give it a try. I downloaded all the written materials I could find on the internet, and reviewed many YouTube videos.

I found contradictory info in multiple places, especially on recommendations for different materials and methods for set up and operation. I was not using a brand-new, untried printer, but one that had been out for a while, and was very popular at one time.

My first print after setup and checks was for the whistle pull (on the end of the whistle cord). What a disaster! It was lumpy, irregular, and never made it to the end of the print before the top ripped off and became a gooey lump around the extrusion head! Well... I got to learn how to clean the bed and print head anyway.

That's when I learned about the 400 or so configuration settings. Now cursing every programmer I have ever known (including me) for parameterizing every known variable at stake, I learned that you need to start with the "correct" configuration for your printer, head, bed, and material you are working with.

And guess what? If you ask 20 experts, you get 22 answers! You think setting DCC decoder CVs is painful? Ha!

This was the first major lesson learned: You need to experiment with the basics before you can do a production print.



1. Whistle Pulls - My very first 3D prints, improving somewhat left-to-right.

Dave made printing our steam throttle look easy, but it usually took several attempts to get a good result. I was able to print an “acceptable” pull, which I could tolerate and make better by sanding down the rough features, and painting over the rest of my mistakes.

This is not unlike starting off with a new modeling glue, paint, or scenery material. I have never gotten it right on the first try. Those are not the steps we read about in magazines – only the ones we joke about with others over a cup of coffee or a beer.

Now feeling like an accomplished expert in 3D printing, I advanced to printing what I thought was the simpler and smaller part – the pushbutton cap. Easy, right? Well... here’s another learning experience.

Dave used a material called PETG (polyethylene terephthalate glycol) and I had gotten materials called PLA (polylactic acid), which are very common in the 3D world. I thought I was going to use the easy stuff—Ha!

Next came more experimentation with settings – I thought I was completely beyond that. Well... no. The caps needed to fit precisely over the pushbutton ends.

Normally, this is an easy job, as the 3D drawing tools are precise. While I had very little experience with the same tools, in a day or two I could manipulate the 3D objects as needed.

I discovered that the two materials don’t print exactly the same. If I switched between PETG and PLA, I had to change the critical inside diameter of the cap to fit the pushbutton.



J. Regier

PETG vs. PLA

PETG and PLA are two of the more common filaments used in Fused Deposition Modeling (FDM) printers. Both materials offer good strength and durability. However, there are some key differences to think about.

PETG is petroleum based. It has better UV stability for use outdoors, and better water resistance. PETG prints tend to be more flexible and resistant to impact.

PLA is plant based. Prints with PLA tend to be more rigid, with more tensile strength than PETG, but are more brittle. PLA is vulnerable to moisture, which makes it brittle.

PETG has a higher melting and extrusion temperature than PLA. This makes PLA prints less suitable for usage in high-heat applications, but also affects the accuracy and tolerances for extrusion.

The positive side was that I was in for another solid lesson on experimenting with 3D printers and materials. Another 16 or so print runs (thank goodness they took only about 12 minutes apiece), and I could fit a cap over the end of a pushbutton.

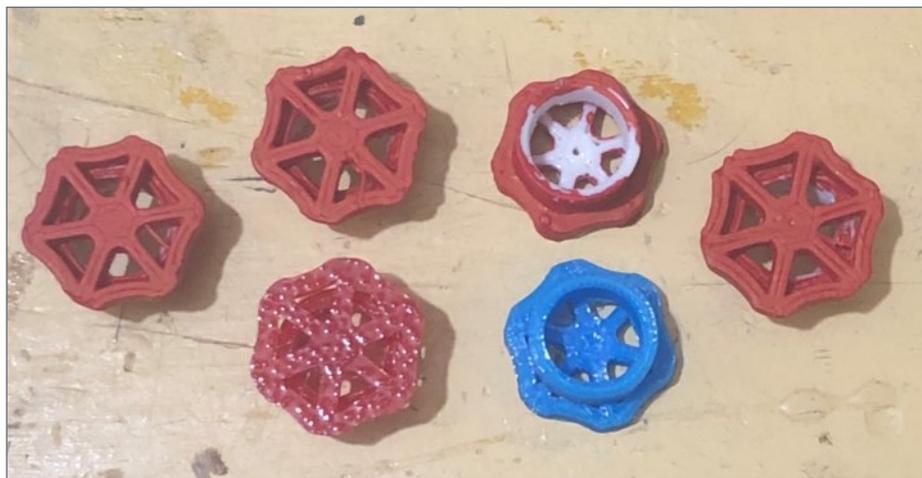
Unfortunately, it was so tight that when I tried to remove it, I ripped the pushbutton apart, and faced replacing the button entirely! The inside of the cap distorted while printing just enough that the top was slightly narrower than the bottom.

It felt like it went on perfectly – well, maybe too perfectly – and would not come off. I went back to the drawing board, and made a few more adjustments, eventually getting a workable fit [2].

Now if you think I am telling you this to discourage you – you are dead wrong! When used correctly, the 3D printer was accurate, very quiet,

and emitted very little odor . The printing process was quick (although our largest part takes hours to print), easily adjusted/ corrected, and unbelievably versatile.

Tools, guides, forms, boxes, covers, holders, and construction jigs are also easily made, especially compared to older techniques. The difference is so remarkable that I think I will need to invest in a 3D printer in the near future. It is easy to see the opportunities and advantages ahead for model making – a door has opened. ☑



2. Pushbutton Tops/Appliques. The top four are printed with PLA, and painted. The bottom two are PETG.



GEOFF BUNZA



Geoff started modeling when he received a Mantua train set for Christmas, at age 6. He fed his interests through college, becoming a member of the Tech Model Railroad Club (TMRC) at MIT while getting his doctorate and three other degrees in Electrical Engineering.

He models the New York Central Railroad, the Great Northern Railway, and Maine narrow gauge in HO_n30. Scale model animation in HO is one of his great interests.

Geoff has authored numerous articles on animation for various magazines, and has presented clinics at many conventions. He is blessed with his wife, Lin, in marriage for 45 years and their two terrific sons. ■



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Breathe new life into old freight cars: 2

YouTuber **H0 Scale Rio Grande** demonstrates the process he uses to convert cheap low quality flat cars into superb detailed rolling stock models.

 **VIEW READER COMMENTS**

In this video, **Rio Grande** takes three low quality flat cars and walks through the upgrade process. Many of his techniques can be used on similar cars and he shows them up with good lighting and crisp focus. This 9-min video has an excellent process for getting realistic flat cars from cheap trainset models. ☑

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RICHARD BALE AND JEFF SHULTZ
REPORT THE LATEST HOBBY
INDUSTRY NEWS ...



NEW PRODUCTS FOR ALL SCALES



New from **Ring Engineering/ RailPro** is the AM-2S accessory module. The AM-2S can control motors such as in turntables, swing bridges and oil pumps, lights, display light effects, and play custom loaded sounds such as farm animals or motors through an included 13 Watt audio amplifier. The AM-2S is equipped with eight outputs that can be used as up to four motor outputs or eight sourcing outputs, and eight I/O that can be configured for eight inputs or sinking outputs. The current configuration is for two motor outputs, four sourcing outputs, and eight inputs.

Info: ringengineering.com

Woodland Scenics has published a new scenery manual titled The Complete Guide to Scenery. The 200 page book combines Woodland Scenics published The Scenery Manual and The SubTerrain Manual into one book, expanding the two original

THE LATEST MODEL RAILROAD PRODUCTS, NEWS & EVENTS



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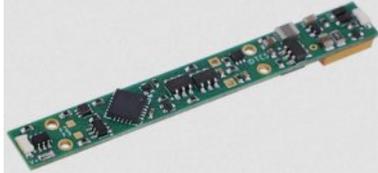
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manuals with more information. Supported by full-color photos and illustrations, the book offers step-by-step methods, as well as tips and techniques helpful in modeling realistic scenery.

Info: woodlandscenics.woodlandscenics.com

ELECTRONICS PRODUCT NEWS



TCS has released a drop-in decoder, the AZL2D5, for use with the American Z Line SD40-2 and SD40T-2 Z scale locomotives. A non-sound decoder, the AZL2D5 includes an

onboard Keep Alive, BEMF motor control, 3 onboard LEDs, 2 auxiliary LED outputs, and RailCom.

Info: www.tcsdcc.com

HO SCALE PRODUCT NEWS



New economy priced HO scale freight car kits coming from **Accurail** include this Susquehanna & New York USRA twin-bay coal hopper. The model is based on a prototype built in 1917.



The kit for this 40' Northern Refrigerator Car wood reefer comes with Andrews trucks.



Coming soon from Accurail is a kit for this 40' Chicago West Pullman & Southern insulated plug door steel boxcar.



Also due soon is an HO scale PS-2 triple-bay covered hopper based on a prototype built by Pullman-Standard.

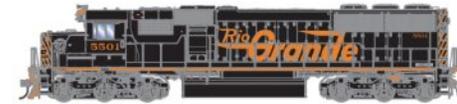
All Accurail car kits come with appropriate trucks with Delrin wheelsets and Accurail knuckle couplers.

Info: www.accurailinc.com

At the top of **Athearn's** recently announced November 2025 production schedule is a new Genesis series EMD SD50. Built by EMD from 1980 to 1987, the 3,600hp locomotive was delivered with optional HTC or Flexicoil trucks. The Genesis model will be produced from all new tooling.



Models decorated for Chessie System, Denver & Rio Grande Western and CSX all have 4,000 gallon fuel tanks, rounded anticlimbers and Nathan K5LA horns.



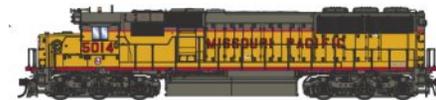
Athearn SD50s decorated for Chicago & North Western, Missouri Pacific and Kansas City Southern have larger 4,500 gallon fuel tanks. They also share Xenon strobe lights. The CNW unit will have that road's



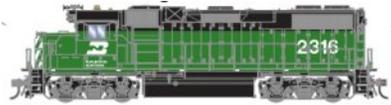
unique triangular antenna while the KCS version will feature an offset cab headlight.



Features shared by all of this newly-tooled SD50s in this release include correct dynamic brake intake and exhaust grille placement, fuel tanks with detailed fillers, fuel gauges, and breather pipes; operating LED number boards and class lights, uncoupling levers, MU and



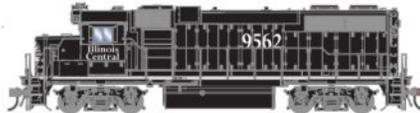
trainline hoses, full cab interior, windshield wipers, lift rings, sander lines and the proven Genesis all-wheel driveline.



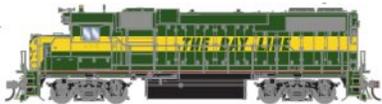
Athearn has included an EMD GP38-2 upgraded to Genesis status in its November 2025 production schedule. The model is based on the more than 2,000 prototypes EMD delivered between 1972 and 1986. Road names for Athearn's HO scale version will include Burlington Northern and Southern Pacific. Both represent late Phase production with corrugated grilles, 3600 gallon fuel tanks and Stratolite beacons. The SP unit will have modified L cab windows.



The Illinois Central GP38-2s in this release represent ex- GMO units with smaller 2,600 gallon fuel tanks and Phase 1 bodies with chicken wire grilles.



GP38-2s decorated for Cleveland Electric and Atlanta & St. Andrews Bay are both Phase 1 bodies with chicken wire grilles and 2600 gallon tanks. Distinctive features include a footboard pilot on the A&StAB unit and dynamic brakes on the CE locomotive.



All of the GP38-2s in this release will come with Blomberg trucks, operating LED number boards and class lights, coupler cut levers, MU and trainline hoses, windshield wipers, lift rings, wire grab irons, sander lines, cab interior details, Celcon handrails, and fully detailed fuel tanks with fuel fillers, fuel gauges, and breather pipes.

Both the SD50 and GP38-2 will have the Genesis driveline that features a 5-pole skew wound motor, machined flywheels, and

multi-link all-wheel drivetrain, all-wheel electrical pickup and all-wheel gear drive. They will be available DCC-ready with Quick Plug plug-and-play technology with 21-pin NEM connector.

Athearn's November 2025 production schedule includes two versions of an International Car Corp. wide vision steel caboose decorated for Denver & Rio Grande.



A mid-1970s version of the D&RGW caboose has running boards, end ladders and a firecracker-style antenna.

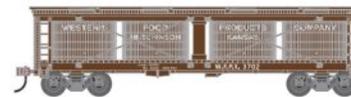


The mid-1980s version of the Rio Grande caboose does not have running boards and the ladder is on the side of the car body. One of the windows has been replaced with a Ram air filter ventilation system plate and the entire car is painted orange.

Both models will include a package of non-functional marker lights that can be installed by the customer. They will be available with DCC and lights, and with DCC, lights and sound.

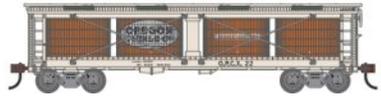


Athearn plans to release a new production run of 62' tank cars in November 2025. Road names will be Burlington Northern, Procor, Alberta Gas, Standard Chlorine, Packerland Packing and White House. The model will ride on appropriate trucks with machined metal wheels. The excessive length of this car requires a minimum 22" track radius for reliable operation.



Sixty-five years ago Irv Athearn introduced a Blue Box kit for an HO scale 40' pickle car. The retail price was \$3.25. Athearn plans to upgrade the tooling, with special attention to the turnbuckles, install McHenry knuckle couplers and Bettendorf-type trucks with machined metal wheels. The

upgraded ready-to-run model is scheduled to be released in November 2025.



Road names will be Western Food Products, Hot Ones Pickled Jalapenos, Sanchez Snack Pickles, Oregon Pickle Company, Particular Pickles Inc., and JB's Extra Fancy Pickle Chips.



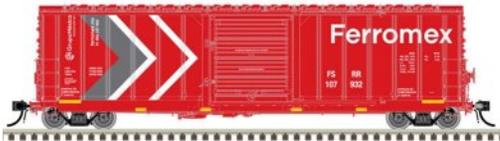
Completing the list of new Athearn models scheduled to arrive in November 2025 is an HO scale 20' corrugated stackable container.



Carrier names on the intermodal containers will be K-Line, P&O, Cosco, Site Box, Trident, and Jay Container Service. Each model will be individually numbered.



Info: www.athearn.com

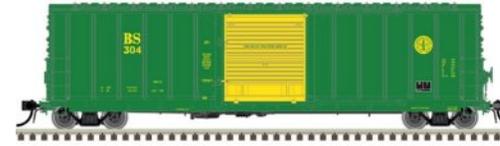


Atlas is taking preorders for a CNCF 5000 boxcar in HO scale. Built in Mexico, 1,500 CNCF 5000s were ordered in the 1970s by U.S. railroads as incentive per diem cars and Mexican railroads ordered thousands more into the 1980s, making them appropriate for layouts from then until the current day.



This run of CNCF 5000s will be decorated for Birmingham Southern, Canadian Pacific (Ann Arbor patch out), Ferrocarril del Pacifico, Ferromex, Grand Trunk Western (Rock Island patch out), New York, Susque-

hanna and Western; and Rock Island. Variations in the car include two body styles, two end styles, and five door styles.



The cars feature full underbody detail with separate brake rigging, separately applied wire grabs, blackened metal wheels, and metal couplers.

Info: shop.atlasrr.com



R. Bale

ALCO RS-3 ROAD SWITCHER

The American Locomotive Company introduced the 1,600hp RS-3 road switcher locomotive in May 1950.

Designed specifically to compete with EMD's GP7, the RS-3 would become the most commonly seen Alco locomotive across the country. Schenectady-based Alco and its Canadian counterpart, Montreal Locomotive Works, built 1363 of these versatile locomotives before production ended in late 1956. Spotting features of the familiar and reliable RS-3 included pronounced rounding at the corners on the cab and long, low hoods, giving the locomotive a more streamlined appearance than its RS-1 predecessor. The radiator-fan housing was also rounded. The short hood could accommodate a steam generator. Because of this option, and the RS-3s good looks, some railroads elected to employ theirs in passenger/commuter service.



Bowser Trains is accepting late pre-orders through August 9, 2024 for an Alco

RS-3 locomotive. Delivery of the Executive series models is scheduled for the fall of 2025.



Road names available on this release include Rock Island, New York & Susquehanna Western and Lehigh & Hudson River.

Additional road names include Denver & Rio Grande Western and Conrail patched on an ex-Lehigh Valley unit.

Individual details on the HO scale version of the 1950s-era road switcher include air hoses, windshield wipers, grab irons, coupler lift bars and fuel tank. All road names will be available in a DC version with a 21-pin DCC plug or with ESU LokSound V5 DCC decoder.



Completing the list of road names available for Bowser's RS-3 are a BN patch on an ex-Northern Pacific locomotive, Central New Jersey, Penn Central, Greenwich &

Johnsonville and Delaware & Hudson in both the road's standard and all blue schemes.

Info: bowser-trains.com



Broadway Limited has announced plans to produce an HO scale model of the famous PRR S1 6-4-4-6 steam locomotive. Delivery is scheduled for the fall of 2025 with an order deadline of

November 7, 2024. The boiler, cab, and tender body will be handcrafted brass mounted on a die cast metal chassis. Special lighting features include separately controllable headlight, rear light, cab light, rear marker lights and number boards.



The model will be equipped with rubber traction tires on one set of drivers. Two spare flanged drivers will be included for hobbyists preferring to have a more prototypical appearance. An additional feature includes synchronized puffing smoke with exhaust chuff sound.



Operating options include BLI's Paragon4 Sound/DC/DCC sound system with integral GoPack capacitors and a no-sound Stealth

DCC-Ready mode that will operate on DC out of the box. Decorating schemes will include the original PRR as delivered scheme, the 1939 World's Fair appearance, a fantasy Tuscan Red version, and unlettered models.

Info: www.broadway-limited.com



InterMountain Railway InterMountain is accepting advance reservations through

August 31, 2024 for a new production run of PS-1 60' boxcars. The HO scale model will come with appropriate trucks with InterMountain's machined metal wheelsets.



Road names will be Chicago & North Western, Great Northern, Chessie System, Route Rock,

Northern Pacific, Santa Fe, Penn Central and Chicago Burlington & Quincy. The eight decorating schemes will be available in

multiple road numbers.

Info: www.intermountain-railway.com



R. Bale

PS-1 BOXCARS

One of the most successful designs of plain boxcars was the PS-1, with Pullman Standard producing more than 100,000 PS-1 boxcars between 1947 and 1963. By 1957 more than 78 railroads had purchased PS-1s. Although commonly referred to as 40' or 50' cars, the interior lengths were 40' 6" and 50' 6" respectively. The sides of most PS-1s were assembled of butt-welded steel panels riveted to the door frames and corner posts. Between 1948 and 1954 Pullman Standard produced a number of 40' PS-1s with 10-panel riveted sides. Customers could specify side door openings of 6, 7, 8, and 9' on the 40' cars, and 8, 9 or 15' on the 50' cars. Double doors could also be specified. Customers had a choice of Pullman Standard, Youngstown, or Superior sliding side doors. The corrugated steel ends were of Pullman Standard design stamped in two sections riveted together. The assembled end was riveted to the sides and at the roof. PS-1s built after 1949 had a signature of six small rectangles at the top of the ends. Polling pockets and the type of end sills were optional. The copper bearing galvanized roof was composed of riveted panels of Pullman-Standard design. The cars came with Apex or U.S. Gypsum steel brake platforms and running boards. The brand of geared hand brakes varied with Miner, Ajax model IP80, and Equipco type 4000 being among the most common.



Kadee is currently selling two HO scale versions of a 40' PS-1 steel boxcar with 6' Youngstown sliding doors. A painted but unlettered model with high tack boards, riveted end seams and narrow

bolster tabs represents Pullman-Standard production during 1950-1953.



A PS-1 decorated for the Ann Arbor Railroad, a subsidiary of the Wabash, is also currently available. The model represents a car produced by Pullman-Standard in 1956 with

lower tack boards and a wider bolster tab.



Details on both models include slender grab irons, ladders, stirrups and handrails, and a see-through running board and brake step. The brake rigging is accurate and the detailed brake wheel has the proper curved contour. The ready-to-run models come with Kadee Magne-Matic metal couplers and appropriate

Bettendorf-type self-centering trucks with metal wheels.

Info: www.kadee.com

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R. Bale

KRAUSS-MAFFEI DIESEL HYDRAULIC LOCOMOTIVE

Most road engines available in the early 1960s were rated at 2,000hp or less, forcing railroads to link a half dozen or more GP7s, GP9s, GP18s and GP20s together to handle the ever-increasing size of freight trains. America's locomotive builders were slow in offering motive power with higher horsepower. In 1961 Southern Pacific surprised the North American railroad industry by purchasing three revolutionary 4,000hp diesel hydraulic locomotives from Krauss-Maffei, a Munich-based German manufacturer. Krauss-Maffei's ML 4000 locomotives utilized two Maybach V16 prime movers and a Voith hydraulic transmission. The hydraulic transmission was an effort to eliminate the complexity and maintenance issues of electrical traction motors and their related controls. The ML 4000 cab body was distinguished by a distinctive turret cab. The Denver & Rio Grande Western ordered three ML4000s but sold them to SP in 1964 when they proved unsuitable in mountain service.



PIKO-America has scheduled a late August release of a Krauss-Maffei ML 4000 diesel hydraulic locomotive decorated for Denver & Rio Grande Western. Three road numbers will be available.

With the exception of a large D&RGW-style barrel headlight, details will be the same as the previously released Southern Pacific version of the HO scale ML 4000.

Lighting features include a separately controllable Gyalite, number boards, classification lights, and cab interior lights. The model is made of a heavy diecast chassis and an injection molded plastic body with numerous metal details added.

Power comes from a large can motor with dual flywheels. Both DC and DCC/Sound versions of the model will be available in this late summer release.

Info: www.piko-america.com



Rapido Trains is developing a Canadian Pacific GMDD GP9u and matching slug units. The HO scale model will be based on early GP9 diesels that were modified with chopped noses, updated electronics and

rebuilt 567C prime movers. They were identified as GP9u.

Scheduled features include detailed piping and traction cables, metal handrails, Blomberg trucks, and working track, classification and control stand lights. Details appropriate to specific road names and numbers include working ditch lights and footboards or front and rear plows.



The fully-powered slug units, using either former SW8, SW900 or SW1200RS car bodies, will

have lighting and flashing beacons, and AAR Type A trucks with rotating bearing caps.



Paint schemes on the initial release of the GP9u will be St. Lawrence & Hudson, Cando, Southern Railway of British Columbia, and four CP schemes (Multimark, Beaver, No Multimark, and new block lettering).

Operating options for both models will be DC/Silent (21-pin DCC Ready) or DCC/ESU V5 LokSound options. DCC equipped models include MoPower capacitors. A deadline to order and planned release date are TBA.



Rapido is updating its Superior stainless Budd Coaches with newly tooled HEP2 car sides and new

HEP1 and HEP2 car ends. An all-new VIA Rail HEP-equipped coach is also being prepared.

Features scheduled for each of Rapido's Superior stainless coach include realistic stainless-steel finish, track-powered interior lighting compatible with DC and DCC systems, full underbody detail including separate air, steam and electrical lines; accurate D22 brake equipment and piping, separate metal grab irons and end gates, and sprung diaphragms. The models will come with metal knuckle couplers and detailed 41-NDO-11 trucks with end frames.

HEP1 and HEP2 cars will have working end marker lights. HEP2 cars will have new windows, body skirt details and HEP underframe details. HEP2 (ex-SP Budd coach rebuilds) will be available in VIA Rail 1996-2010 scheme as well as the present day scheme introduced in 2020.

Decorating schemes for the Canadian Pacific/VIA HEP1 version will include Canadian Pacific (Maroon, 1955-late 1960s), CP Rail (Action Red, 1968-early 1980s), and three VIA Rail schemes, including early (1978-mid 1990s), VIA Rail (HEP1, Blue band, Canada Scheme (1998-present) and VIA Rail (HEP 1, Renaissance/Green (2020-present). The latter two VIA Rail cars will have new HEP end details. The final order deadline and delivery date are TBA.



Rapido is preparing to release three new X-3 versions of the standard UTLX tank car. The new HO scale models will be based on the 8,000 gallon and 10,000 gallon non-insulated prototypes as well as the insulated 10,000 gallon version with heater coils outside the tanks with wagon-style jacketing.

Details include correctly modeled tank bolster pads, end platforms, domes and dome fittings, UTLX-style warning placard holders and full underbody detailing with two different brake systems. The ready-to-run models will come with uncoupling bars and Andrews or Bettendorf-type trucks with machined metal wheels.

The 8,000 gallon X-3 will be available decorated for two UTLX schemes (1927 and 1950), UTLX Skellysolve (1960), Products Tank Car (mid-1950), Procor Limited (1955), and UTLX Hexane (mid-1950s). Decorating schemes for the 10,000 gallon X-3 will be UTLX (Late 1930 and 1950). The insulated X-3 will be available for a late 1930s "Breadbox" scheme. Undecorated versions will be available for each of the three tank cars. The order deadline is September 16, 2024 with delivery is TBA. Info: www.rapidotrains.com



Scale Trains has announced a new run of Rivet Counter Line HO scale Pullman-Standard 5820 covered hoppers. Nearly

70 feet long, the cars have four bays and are equipped with pneumatic discharge gates with shaker brackets. Three production versions of the cars have been tooled along with appliances spanning the length of the car's production.



Road names in this release include Americas Styrenics, Pullman Leasing, Noryl, GE Rail Services (4 schemes),

Carlton, and Entec Polymers (2 schemes).



The cars are equipped with Barber S-2 100-ton trucks with one of two styles of rotating bearing caps – Timken or

Brenco. The cars are weighted to match NMRA specifications. Info: www.scaletrains.com



Tangent Scale Models July 2024 release is the newly tooled HO scale

Thrall Car 5880 cu. ft. 60' double plug door box car system. Thrall began production of these Plate C cars in 1968 for Ford service. They featured centered double plug doors, double weld side construction, and X-panel roofs. Twelve railroads purchased these cars, which remained in service into the 2000s.



Two different underframe/end of car cushioning systems were employed on the

cars, with some railroads getting cars equipped with Freightmaster End-Of-Car cushioning and Stanray coupler centering devices and others getting Keystone EOC cushioning with a modified frame and a slightly different brake system configuration.



Road names in the first release include Burlington Northern, Norfolk and Western,

Union Pacific, and Western Pacific. Undecorated kits for both styles of EOC cushioning are also available. The cars feature numerous road name and number specific details such as brake stands, trucks, and roller bearing caps.



36" CNC machined wheels are standard as are Kadee scale-head couplers. Replacement

semi-scale wheels are available. Info: www.tangentscalemodels.com



As noted in the June 2024 Briefly Noted At Press Time, **Walthers** has announced a newly tooled 52' single hood cushion coil car based on a National Steel Car Company prototype. The 110-ton prototype cars were built between 1997 and 2000. Road names in this first release will be BNSF, Canadian Pacific, Elgin, Joliet & Eastern; Northwestern Oklahoma Railroad, Transportacion Ferroviaria Mexicana (TFM), and Wisconsin Central.



Part of the WalthersProto series, the cars include a die cast metal chassis, factory applied wire parts, full brake gear, detailed interior

with positionable coil braces, 36" RP-25 turned metal wheels, and Proto MAX magnetic metal knuckle couplers. They are expected to arrive in Fall 2024.



In the Walthers Mainline series of HO scale models, a newly tooled 40' Pennsylvania Early X-29 boxcar has been announced. With a design that was copied by other

railroads and the 30,000 produced for the PRR, they were a frequent sight in trains from the 1920s through the 1960s. This version of the X-29 features flat steel sides, ends, and roofs; with either three-panel steel doors or Youngstown doors.



Roadnames in this release include Baltimore & Ohio, Central Railroad of New Jersey, Chicago Great Western, Main Central, Pennsylvania Railroad (2

schemes), and undecorated. The cars will include a detailed underbody with brake gear, 33" RP-25 contour turned metal wheels, and Proto MAX magnetic knuckle couplers.

Info: www.walthers.com

N SCALE PRODUCT NEWS

Athearn has scheduled the release of new N scale 20' corrugated stackable containers in November 2025.



Carrier names on the intermodal containers will be K-Line, P&O, Cosco, Site Box, Trident, and Jay Container Service. Each model will be individually numbered.

Info: www.athearn.com

Bluford Shops is preparing final tooling for a 52' 6" mill gondola with realistic dented sides. Three degrees of denting will be available on the N scale model.



Lightly dented gondolas will have multiple deflections in the side sheets above the floor line.



The medium dented version will have side sheets visibly puffed

outward between the rivet lines as countless small dings to the inside faces accumulated and stretched the sheets into rough domes.



Heavily dented models will have many of the ribs deflected outward and the panels puffed out to a greater extent.

Road names on the initial release will be Conrail, CB&Q, Erie-Lackawanna, Great Northern, NKP, Pittsburgh & Lake Erie, The Rock, Frisco, and New York Central. Each road name will be available with light, medium, and heavy denting.

Road name variations include Dreadnaught or Pullman-Standard style fixed ends with Ajax end mounted brake housing

and two styles of brake wheels; or drop ends from Dreadnaught or PS with end mounted lever action hand brakes or side mounted brake wheels. Availability will be in 2025.

Info: www.bluford-shops.com



R. Bale

SANTA FE 4-8-4 No. 3751

In 1927 Santa Fe purchased one 4-8-4 steam locomotive from Baldwin Locomotive Works.

Numbered 3751, it was Baldwin's and the Santa Fe Railway's first 4-8-4 type. In 1936, No. 3751 was converted from coal to oil and was given a larger tender with a capacity of 20,000 US gallons of water and 7,107 gallons of fuel oil. In 1941, No. 3751, along with the other 13 locomotives in its class, received major upgrades that included replacing the original 73" spoked drivers with 80" Boxpok wheels, a new frame and Timken roller bearings on all axles. No. 3751 proved successful in passenger service for Santa Fe from 1927 until being retired in 1957 when the much admired locomotive was placed on display. In 1981, the San Bernardino Railroad Historical Society was formed for the purpose of restoring and operating No. 3751. The Society maintains the locomotive in operating condition and occasionally uses it on mainline excursion trains.



Broadway Limited has released additional details on the N scale Santa Fe No. 3751 4-8-4 now under development for release in the fall of 2025.



In this first production run, BLI will offer four in-service Santa Fe models: two variations

of No. 3759 (both in-service and as it appears today), No. 3751 as it appears today and an unlettered model.

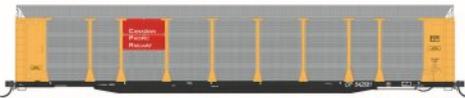


Each locomotive will be available in Paragon4 Sound/DCC or Stealth Series, which features

No-Sound/DCC-Ready options. The order deadline for guaranteed delivery is November 14, 2024.

Info: www.broadway-limited.com

InterMountain Railway has released a new group of N scale bi-level Autoracks to dealers. The ready-to-run models have etched metal see-through side panels and non-opening brass end doors. The Autoracks come with Micro-Trains couplers and trucks with 33" metal wheels.



Road names on this release are Southern Railway, CSX, Missouri Pacific, SSW-Cotton

Belt, Conrail, Burlington Northern, Chicago & North Western and Union Pacific. The N scale models require a 15" track radius for reliable operation.

Info: www.intermountain-railway.com



New N scale models released by **Micro-Trains** this month include a Maine Central wood caboose and a mill gondola decorated for Pennsylvania Railroad.



Also new from Micro-Trains is a 33' Reading twin-bay hopper car with a coal load. Info: Contact a dealer.



Rail Smith is booking reservations for a Northern Pacific Vista Dome sleeper. The N scale model will be decorated in the famous Raymond Loewy two-toned Pine Tree scheme NP applied to lightweight equipment on its North Coast Limited. Delivery is scheduled for the second quarter of 2025.



A Broadway Limited E unit representing the 1974 Union Pacific Preamble Express E9A is being offered for pre-order with delivery expected in the Summer of 2025. Both Paragon4 Sound/DCC

and Stealth versions will be available.

Rail Smith is also taking reservations for a Spokane, Portland & Seattle NW-2 switcher. Delivery of the N scale model is planned for early 2025.

Info: lowellsmith.net



ScaleTrains has announced its first four-axle N scale locomotive, the EMD GP30. A Rivet Counter

line locomotive, the GP30 will include road name and number specific details, such as variations in the cab, dynamic brakes, doors, grilles, trucks, and other items. LED front and rear headlights, as well as Mars or Gyra lights as appropriate will be included, with ditch light equipped units in future runs.

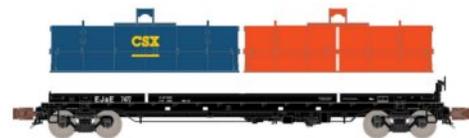


Road names in the first run include Chicago & North Western (2 schemes), CSX (RDMT road slug), Rio Grande (2 schemes), Pennsylvania RR, Southern (3 schemes), and Union

Pacific (3 schemes). One of the Southern schemes will be #2601, currently at the North Carolina Transportation Museum and two of the Union Pacific schemes will be freight and passenger B units.



Locomotives will be available either DC/DCC ready with an E24 connector or DCC/Sound equipped with an ESU LokSound 5 Nano decoder and cube-type speaker.



Additionally, ScaleTrains has announced a new run of the N scale Rivet Counter Thrall 48' 2-hood coil steel cars.

This release includes six road names with 15 paint variations. Constructed in the 1980s and 1990s, these cars are still in service across North America.



Road names in this release include Burlington Northern, BNSF (3 schemes), CSX, CHTT (3 schemes), Elgin Joliet & Eastern (4 schemes),

and Norfolk Southern (3 schemes). The models also feature five unique hood versions, four positionable load dividers, four die cast unwrapped coil steel loads, 16 walkway side supports, an simulated wood trough interior.

Info: www.scaletrains.com

STRUCTURES AND SCENIC SUPPLIES

Athearn plans to release an HO scale generic sedan in November 2025 decorated in a range of options.



Two taxi will be available decorated in black over yellow and yellow over black. They

will come with a roof top sign and a large advertising sign on the rear deck.



Additional schemes include a U.S. Army car, a civil defense vehicle and an all-red fire chief car. An unlettered model will be available in metallic orange.



The models will have a molded interior with a separately applied steering wheel, clear window glazing and rubber tires. The taxi and

emergency vehicles will come with a roof top beacon or taxi sign as appropriate.

Info: www.athearn.com



Berkshire Valley Models has released the #2150 Grain Elevator in HO scale. Based on the American Model Builders Country Grain Elevator, it has been converted from a plastic kit to an easier to assemble wood kit. The 4" x 7" x 9" high model includes the colorful "Faultless Feed"

signage from the cover of January 1996 issue of Railmodel Journal along with other signs.



An O scale milk truck, #214, is also being released by Berkshire Valley Models. Made of unpainted white metal and laser-cut parts, the kit includes

decals for both Pevely Milk and Hoods Dairy. Two milk cans are included as detail parts.

Info: www.berkshirevalleymodels.com



Fos Scale Models is selling an HO scale craftsman style kit that builds into a small but highly detailed service station. Identified as MD Garage, the structure features partially exposed concrete block construction and loads of detail. The kit

consists of laser-cut walls, roof, doors and windows; stucco powder for wall finish, color signs, and numerous metal and 3D printed detail parts. The completed structure has a footprint of 3" x 4".

Info: www.foscalemodels.com



East Coast Circuits has released a new HO scale LED lighted vehicle, the USPS LLV (Long Life Vehicle) mail truck. Using an LLV produced by

Walthers, ECC has added headlights, taillights, front hazard lights, and front and rear warning or strobe lights as appropriate. Two versions, with either a 1980s US Mail logo or the 1993 to present eagle head logo, are available. Mirrors are a customer installable item due to their fragility.



Also just released is an HO scale Portable Light Tower. Equipped with 16 LED lights, the light tower includes a rotatable mast and optional side outriggers. The tower is currently available painted in yellow, orange, and green color schemes. All ECC products require a 9-12V DC power source, which either the modeler can supply or ECC sells.

Info: eastcoastcircuits.com



miniprints has released a new two part tree house model in HO, S, and O scales. Fitting around a modeler supplied tree trunk, the kit includes a ladder that can be trimmed to the needed height and a bonus MINIME figure. The tree house is available in both painted and unpainted versions. Info: miniprints.com



Motrak Models has released an S scale model of the Boston & Maine North Hampton Station. Still in existence, the station is now professional office space and was a residence in the

past. The kit includes laser-cut double wall construction, laser-cut windows, doors, chimney, and shingles, and tab and slot construction.



The main station footprint is 12" x 6.5" x 6.5" and the covered platform is 10.5" x 2.75" x 2.75" in size.

Info: motrakmodelsusa.com

Coming soon from **Woodland Scenics** are two new sets of N and HO scale figures appropriate for the summer season.



Sun Tanners includes four female sun worshipers in bikinis, two on towels and two on deck chairs. The figures come hand painted.

Beachgoers consists of three male and three female painted

figures, with three seated or reclining and three standing or walking.



Also coming soon is a new Built-&-Ready Kids Clubhouse, coming in N, HO, and O scales in late July or early August. Measuring 1-1/4" x 1-5/16" x 1-3/16" in HO scale, the clubhouse comes painted and includes a car seat couch and wooden pool table.



Also available soon is a Built-&-Ready building named the Cozy Cabin. Fully constructed, painted, weathered, and pre-lit with the JustPlug lighting system,

the Cozy Cabin replicates a small log cabin and features a full interior, including a flickering fireplace and bear rug on the floor. Measurements for the HO scale model are 2-5/16" x 3-7/16" x 2-1/8".

Info: woodlandscenics.com

NEW DECALS, SIGNS AND FINISHING PRODUCTS

RailTrain Hobbies offers a selection of decal sets for PCF B-70 boxcars in lettering schemes not included in Rapido's original release of the HO scale model.



Item XM-001 includes material to correctly letter an SSW Cotton Belt SP class B-70-63 boxcar with Hydra-Cushion For

Fragile Freight slogan. The set includes 20 pre-arranged car numbers, alternate build dates and standard 0-9 numbers that can be used to model a specific car.

Item XM-002 includes a similar selection of prototypically accurate decals for lettering an undecorated Rapido B-70 boxcar



as an SP class B-70-75 with a Hydra-Cushion slogan. Data sheets with application information is included with each set of decals.

Info: www.railtrainhobbies.com

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! BRIEFLY NOTED AT PRESS TIME ...

Broadway Limited has changed the order deadline for guaranteed availability of its HO scale Union Pacific business car project from October to August 9, 2024 ...

Cardinal River Models (cardinalrivermodels.com) is booking pre-orders for an HO scale Nickel Plate Road 2-8-4 Class S-2 Berkshire steam locomotives decorated in several road number appropriate schemes ...

Morning Sun has published *Western Coal Cars*, a 96-page softcover pictorial that documents the coal-carrying hoppers and gondolas from 1972 – 2008 through the lens of Robert Harmen, represented chiefly by cars that served the Powder River Basin ...

Shapeways, a supplier of 3D printed parts for model railroaders, has ceased operations and filed for bankruptcy. The company has confirmed that each of its subsidiaries have also filed for bankruptcy ... ■



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Ongoing 2024

ONLINE, Zoom, dates vary, see website. Operation Special Interest Group Meetups – limited attendance available.
 Info: www.opsig.org/Virtual
 Archive: www.opsig.org/Virtual/Past

ONLINE, Zoom & YouTube, Wednesday & Saturday, see Facebook page. “New Tracks” Meetup, hosted by Jim Kellow, MMR.
 Info: newtracksmodeling.com
 YouTube: www.youtube.com/channel/UCMA_VhPb5pjdkAYTdXLceJA

ONLINE, Facebook & YouTube, dates vary, see Facebook page. “NMRax” organized by Gordy Robinson, Martyn Jenkins, Gert Muller, Jordan Kramer.
 Info: www.facebook.com/groups/nmragroup

ONLINE, YouTube, every other Saturday. 4th Division, Pacific Northwest Region, NMRA hosts online layout tours and clinics.
 Archive: www.youtube.com/c/4DPNRMovies

ONLINE, Zoom, Second Tuesdays, 8pm Eastern. "Off the Beaten Track" featuring Narrow Gauge layouts, clinics, and manufacturers.

Info: groups.io/g/NNG

AROUND THE USA, IN-PERSON, Various dates. ScaleTrains.com Road Trip.

Info: www.scaletrains.com/roadtrip

July - August 2024

ARIZONA, PRESCOTT, August 10th, 2024. Beat the Heat Model Train Swap Meet. Embry-Riddle Aeronautical University Event Center, 3700 Willow Creek Rd.

Info: camrrc.com/bth

CALIFORNIA, CROCKETT, August 24-25, 2024. Carquinez Model Railroad Society Open House. 645 Loring Avenue.

Info: cmrstrainclub.org

CALIFORNIA, LONG BEACH, August 4-11, 2024. Surfliner 2024 NMRA National Convention & National Train Show. Westin Long Beach, 333 East Ocean Blvd.

Info: surfliner2024.org

CALIFORNIA, SAN DIEGO, July 27, 2024. San Diego Model Railroad Museum Swap Meet. 1649 El Prado, Enter at the rear of the Casa de Balboa building.

Info: www.sdmrm.org/swap-meet

COLORADO, ESTES PARK, September 21-22, 2024. Rails in the Rockies 27, sponsored by Estes Valley Model Railroaders. Estes Park Event Complex, 1125 Rooftop Way.

Info: railsintherockies.org

GEORGIA, DULUTH (Atlanta), August 24, 2024. 65th Atlanta Model Train Show. Gas South Convention Center, 6400 Sugarloaf Parkway.

Info: www.gserr.com

ILLINOIS, COLLINSVILLE, July 19-20, 2024. St. Louis RPM. The Gateway Center, 1 Gateway Center Drive.

Info: stlrpm.com

ILLINOIS, WHEATON, August 4, 2024. Great Midwest Train Show. DuPage County Fairgrounds, 2015 Manchester Road.

Info: www.trainshow.com/gmtspages/great-midwest-train-show-information

INDIANA, FRANKLIN, August 3-4, 2024. Franklin Train Show, sponsored by the Central Indiana Division NMRA. Johnson County Fairgrounds, 250 Fairground St.

Info: www.cidnmra.org

KANSAS, SHAWNEE, August 10, 2024. Turkey Creek Division Train Show, Shawnee Civic Center, 13817 Johnson D #3802.

Info: tc-nmra.org/TrainShow.html

KENTUCKY, BOWLING GREEN, August 24, 2024. The sHOW Modular Model Railroad Club Annual Summer/Fall Train Show and Sale. Historic Railpark and Train Museum, L&N Depot, 401 Kentucky St.

Info: www.facebook.com/events/7822652997826389

MASSACHUSETTS, ORLEANS, Wednesdays, July-August 2024. Nauset Model Railroad Club Open House with G, O, S, HO, and N scale layouts. Rear of Hilltop Plaza, 180 Rte 6A.

Info: www.nausetmodelrrclub.com

MISSOURI, KANSAS CITY, August 13, 2024. Mid America Train and Toy Show. KCI Expo Center, 11728 Ambassador Dr.

Info: www.midamericatrainandtoyshow.com

OHIO, VAN WERT, July 27-28, 2024. 21st Annual 2024 Railroad Heritage Weekend Model Railroad Show & Swap Meet, sponsored by the Van Wert County Historical Society. Van Wert County Fairgrounds, 1055 S. Washington Street.

Info: vwrrhw.com

TEXAS, AUSTIN, August 24-25, 2024. Austin 2024 Train Show. Palmer Events Center, 900 Barton Springs Road.

Info: austintrainshow.org

TEXAS, PLANO, September 28-29, 2024. 5th Annual Fall Plano Train Show, sponsored by the North Texas Council of Railroad Clubs. Plano Event Center, 2000 East Spring Creek Parkway.

Info: www.dfwtrainshows.com/page/fall-plano-train-show

WYOMING, EVANSTON, July 24-28, 2024. N-Scale Evanston 2024. Historic Roundhouse and Machine Shop, 1500 Main St.

Info: nscalemeet.info

Future 2024 by location

CANADA, ONTARIO, BRESLAU (Kitchner-Waterloo), September 29, 2024. Breslau Train Show, sponsored by Western Ontario Division, NMRA. Breslau Community Centre, 100 Andover Drive.

Info: www.youtube.com/watch?v=sSC-TA_feMM

CALIFORNIA, CROCKETT, August 24-25, September 14, October 26-27, December 7-8, 2024. Carquinez Model Railroad Society Open House. 645 Loring Avenue.

Info: cmrstrainclub.org

COLORADO, GREELY, September 21, 2024. Colorado Rail Proto Meet. Zoe's Café and Event Center, 715 10th Street (9am-5pm) and Colorado Model Railroad Museum 680 10th St. (5pm - 8pm)

Info: corpm.org

COLORADO, PUEBLO, October 10-13, 2024. Rio Grande Modeling & Historical Society joint convention with Missouri Pacific Historical Society. Pueblo Convention Center, 320 Central Main Street.

Info: www.eventbrite.com/e/2024-mphs-rgmhs-joint-convention-tickets-794966836207

ILLINOIS, NAPERVILLE, October 10-12, 2024. RPM Chicagoland 2024.

Info: www.rpmconference.com

MARYLAND, BALTIMORE, September 6-8, 2024. Mid-Atlantic RPM. DoubleTree by Hilton BWI.

Info: www.marpm.org

MASSACHUSETTS, ORLEANS, Wednesdays, July-August 2024. Nauset Model Railroad Club Open House with G, O, S, HO, and N scale layouts. Rear of Hilltop Plaza, 180 Rte 6A.

Info: www.nausetmodelrrclub.com

MICHIGAN, EAST LANSING, November 10, 2024. Lansing Model Railroad Club Show and Sale. Michigan State University Pavilion, 4301 Farm Lane (corner of Mt. Hope, Farm Lane, and College Roads).

Info: lmrc.org

NEVADA, SPARKS, October 16-19, 2024. San Francisco Overland, 2024 SPH&TS Convention. Nugget Casino Resort, 1100 Nugget Avenue.

Info: sphts.org/convention

NORTH CAROLINA, DURHAM, October 17-20, 2024. Piedmont Junction 2024, Mid-Eastern Region NMRA Convention. Raleigh-Durham Marriott.

Info: piedmontjunction.cpd13.org

OHIO, MIDDLEBURG HEIGHTS (Berea), October 5-6, 2024. 50th Annual Great Berea Train Show, hosted by the North Coast Division, NMRA. Cuyahoga Country Fairgrounds, Bagley Road entrance only, 19201 Bagley Road.

Info: thegreatbereatrainshow.org

OHIO, CAMBRIDGE, October 27, 2024. Sixth Annual Buckeye Division Train Show. Pritchard Laughlin Center, 7033 Glenn Hwy.

Info: div6-mcr-nmra.org/trainshow.html

OHIO, MARION, October 10-12, 2024. Central Ohio RPM. Marion Union Station.

Info: centralohiorpm.wordpress.com

OREGON, PORTLAND, October 5, 2024. Bridgetown RPM Meet. Sojourn Suites Portland Airport, 11707 NE Airport Way.

Info: www.brpmm.com

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PENNSYLVANIA, ALTOONA, September 14-15, 2024. 2024 Mike Phillips' N scale Weekend, presented by the Altoona Association of Model Railroaders. Blair County Convention Center, 1 Convention Center Dr. .

Info: www.theaamr.org/n-scale-weekend

PENNSYLVANIA, HARRISBURG, September 21-22, 2024. Anthracite Railroad Modelers Meet XII. Reading Railroad Heritage Museum, 500 South 3rd Street.

Info: readingrrmm.com

PENNSYLVANIA, LINDEN, October 19, 2024. Annual Fall Train and Craft Meet. Woodward Fire Company, 4147 N Route 220 Hwy.

Info: www.ccmrr.org/events.html

PENNSYLVANIA, PITTSBURGH, September 11-14, 2024. 44th National Narrow Gauge Convention. Doubletree by Hilton Hotel Pittsburgh – Green Tree, 500 Mansfield Avenue.

Info: www.44nngc.com

TEXAS, FOREST HILL (Fort Worth), October 25-26, 2024. DFW-Red River RPM. Forest Hill Civic Center, 6901 Wichita St.

Info: redriverrpm.org

WASHINGTON, KENT, November 9, 2024. Boeing Employees Model Railroad Club Annual Swap Meet. Ken Commons Community Center, 525 4th Avenue North.

Info: www.bemrrc.com

WISCONSIN, MILWAUKEE, November 23-24, 2024. Trainfest – America's Largest Operating Model Railroad Show. Baird Center, 400 W Wisconsin Ave.

Info: www.train-fest.com ■



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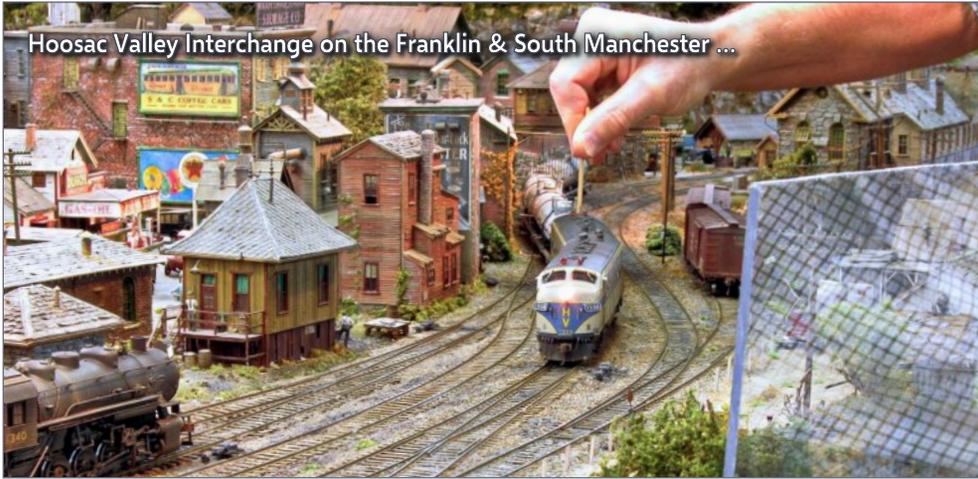
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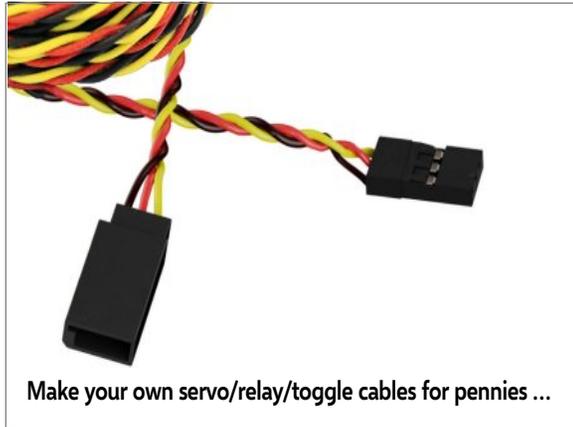
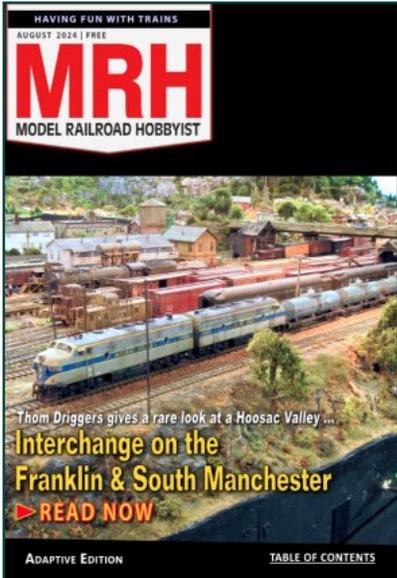
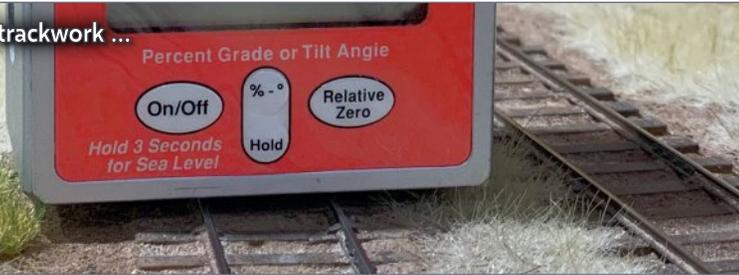
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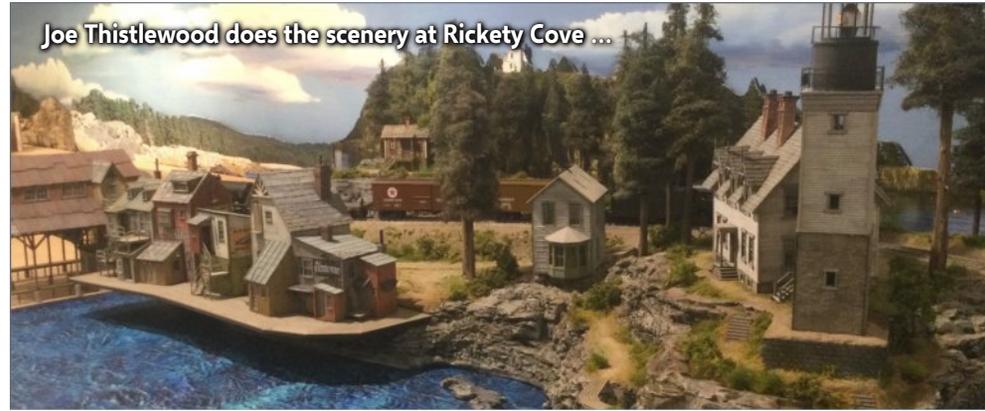
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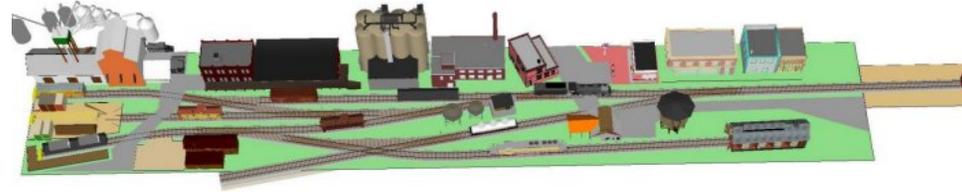
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