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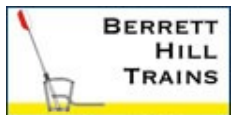
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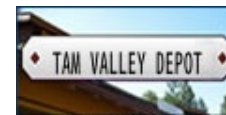
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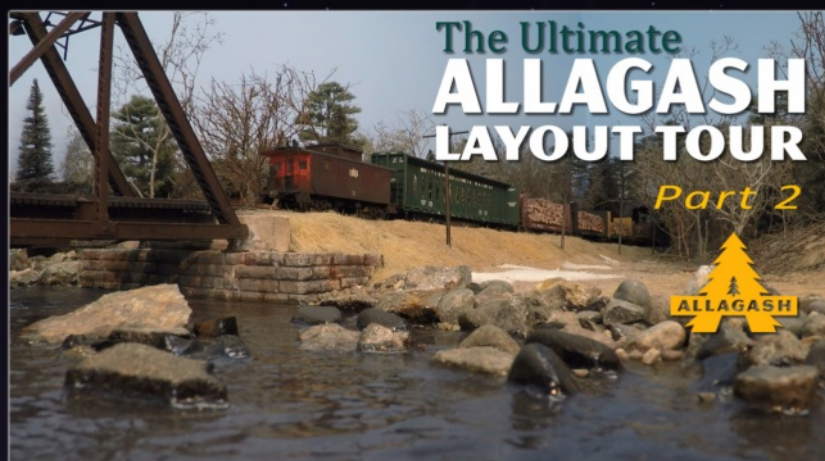
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Model Railroad Hobbyist | December 2022

JOE FUGATE LOOKS AHEAD TO THE YEAR
2023 AT MRH MEDIA ...



THANKS TO OUR MOVE TO OKLAHOMA THIS SUMMER, 2022 has turned out to be a crazy year for MRH Media.

The previous two years were crazy for everybody, and then just as things were easing up, it seems we couldn't leave well enough alone and just had to move halfway across the country in 2022!

So let's look back at the last six months and then look ahead to 2023.

The Oklahoma move

Actually, moving has been in mind since 2015. If you have been a reader for a while, you may remember the 2016 decision to dismantle my Siskiyou Line layout.

Because we knew we would be moving, I decided the layout had to go since it could not move with us. I expected it to be several years before the move happened, giving me time to dismantle the layout without feeling rushed.

As to the details of the move, all we knew is we eventually wanted to relocate, but we weren't sure where. We also knew

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the timing of the move depended on the passing of my elderly mother. She was living with us and we agreed as a family we would not move until she had passed on.

Since my mom was in her late 80s in 2015 and slowly getting more feeble with dementia, we knew we didn't have a lot of time left. The typical life expectancy for dementia patients is about eight years.

We hoped to make the most of having her living with us in her final years, so we were in no hurry. We preferred to avoid sending her "over the edge" health-wise by moving someplace totally strange to her.

My mom passed in February 2021, and after a few months to grieve the loss, we held a family meeting and I declared, "OK, we're free to execute on our desire to relocate as a family, so where do you want to move?"

We finally decided on Tulsa, Oklahoma in March of 2022. It's near the geographic center of the continental US (one of our wish-list items), and it has a lower cost of living and cheaper real estate than Portland, Oregon.

On to Tulsa

Once we had decided on a location, things moved fast. Our son and his family sold their house in late April, and had moved down to Tulsa by May to live in a rental and look for property to buy.

We weren't far behind, selling our house in Portland in May and moving to Tulsa to live in a rental by June.


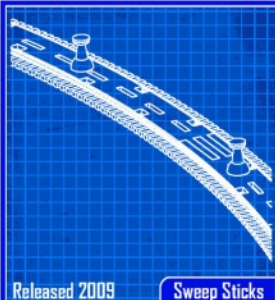

This meant completely packing up MRH Media and Train-Masters TV and moving much of the equipment into storage. We kept two main computers with us and set them up in the one bedroom apartment and lived out of boxes.

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Meanwhile, our son made an offer on some property and we purchased 1.7 wooded acres near our son's property in Skiatook, Oklahoma.

Our son's property sale fell through because the owner backed out. After another month of looking, our son finally bought 20 acres of rural land much farther south near Beggs, Oklahoma. Unfortunately, that's almost an hour away from our Skiatook property.

Long story short, we're selling the 1.7 acres and our son is selling us one of his 20 acres. It's a nice spot that's flanked by trees and has a beautiful view of some rolling wooded hills across the road.

Fortunately, the Beggs location has superb fiber internet that's blazing fast, which is a big plus for MRH Media.



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MRH Media and the move

The pandemic has put an all-stop on layout tours. Folks didn't want strangers in their home just to take pretty pictures of the trains.

Just as things started to ease up, we moved to Oklahoma and have been staying in a one bedroom apartment and living out of boxes. Most of our stuff has been in storage, awaiting some property and a place to unpack.

Unfortunately, that's taken a lot longer than we expected due to supply chain delays and uncertainty over just which piece of property we were finally going to land on.

We're doing a manufactured (MF) home and a steel prefab outbuilding for our garage, shop, MRH office, TrainMasters TV studio and of course space for Siskiyou Line 2.

The MF home has been placed and is being prepared. Looks like we move in just a few days before Christmas. The prefab steel building and concrete slab is looking like sometime in 2023 before we will get to it. We're thinking we need to sell our Skiatook property first and then we'll do the steel building.

How 2023 is shaping up for MRH Media

All the back and forth to prepare land, deal with zoning issues, and to work with contractors has taken us out of the MRH office a lot in the last six months. Once we finally move in here soon, that's at least another 10 days or so out of the office getting moved in and unpacked.

Even though we don't have the steel building up yet, the MF home has four bedrooms and three baths, so there's plenty of space for now to have an MRH office and a hobby work space in there. One of the bedrooms is almost a great room, so that



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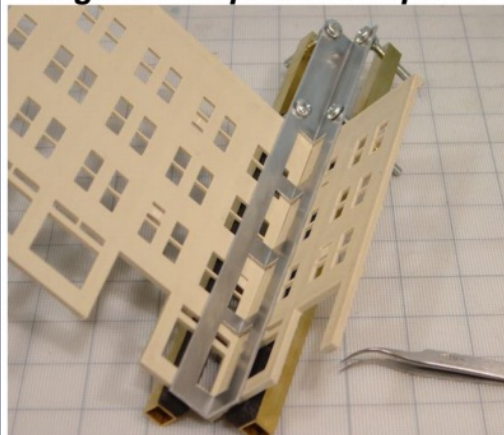


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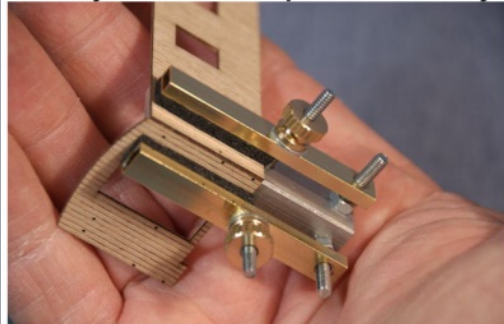
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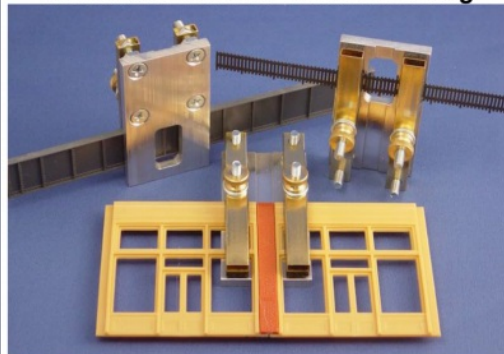
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will be an obvious space to use for the new MRH office.

I can also temporarily use one of the other bedrooms as a temporary TrainMasters TV studio, and we'll still have two bedrooms left for us and a guest.

We should be fairly settled by January 2023, so we will no longer have to stay constrained as to MRH projects because everything's in storage.

I'm also planning a road trip late January to go shoot five layouts, and we're planning for those to be cover stories in 2023. They'll also become layout stories on TrainMasters TV, finally bringing back those to TMTV again!

Once we finish the Ultimate Allagash tour, I have a lot of backlogged segments I need to take out of storage and get up on TrainMasters:

- The Rick Sutton photo-realistic structure build series
- Greg Baker's "Watch me build my layout" series

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- Several Backshop Clinics and DCC Decoded segments.
- I also have Charlie Comstock's layout tour yet to do, as well as an Ops Live on Bruce Chubb's Sunset Valley.
- And I'm hoping to get back to writing the *Locomotives Run like a Dream* book and finish that in 2023.

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Not having all these land and home prep interruptions and finally getting everything back out of storage should help us focus on getting more articles and videos done!

Hooray, back to normal, somewhat at least.

MRH holiday sale coming Dec 26 - Jan 3rd

We'll have some super discounts coming between Christmas and New Years. Watch for the emails.

Siskiyou Line 2

Siskiyou 2 will be built in the 30x60 prefab steel building I've mentioned. That building will also house the MRH office, the Train-Masters TV studio, a workshop, plus act as our garage. I am planning on ~800 square feet for the layout, which is similar to the space I had for Siskiyou Line 1.

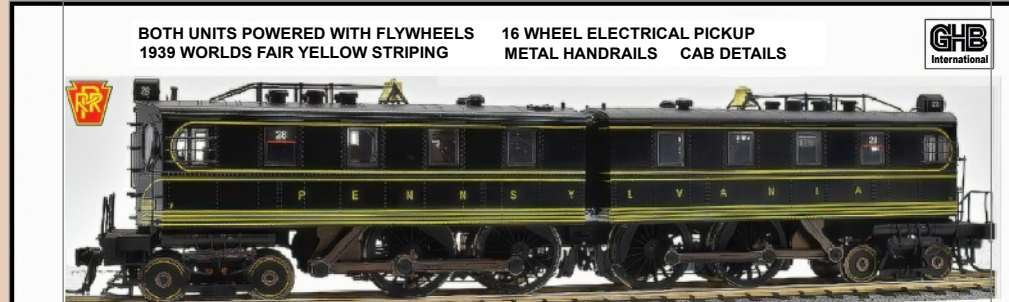
Siskiyou Line 2 will be using TOMA (The "One Module" Approach) techniques in its construction. I plan to document the process

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from planning to implementation as the layout slowly begins to materialize.

We'll be funding the prefab steel building from the sale of our Skiatook property, so to some degree the timing depends on how quickly that land sells. Here's hoping buying bare land for construction is still a hot commodity in 2023 like it's been previously.

Regardless, I'll be planning the new SL2 layout, and I'll let you look over my shoulder as the new layout plan unfolds. Planning a TOMA home layout works a bit differently than a traditional monolithic layout plan, so I'll share those insights with you, too. ☑

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THIS MONTH

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Model Railroad Hobbyist | December 2022

Compiled by **JOE FUGATE**



Trainz to simulate a layout

MRH forum member **NFG-RR** (Denzil S.) started a thread about using the train simulator TRAINZ to build a virtual layout and test it. He also said it's quite a distraction from actual layout building, but a fun one!

MRH Editor Emeritus **bear creek** (Charlie Comstock) posted his TRAINZ learnings, along with some screen grabs of his work (see above).



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

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

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1. MRH forum member **gjslsffan** (Tom H.) posted several photos and videos of his under-construction Quanah Acme & Pacific layout. We have to say, he's coming along nicely based on photos like the one above.

The Quanah Acme & Pacific

MRH forum member **gjslsffan** (Tom H.) has started a thread featuring many videos and photos of his proto-freelanced Quanah Acme & Pacific.

"I grew up along the Quanah Acme and Pacific Railway (QA&P) in the west Texas community of Swearingen, now a long gone ghost town. As far back as I can remember I always liked trains, and wanted a model RY. In 2008 I built a 30'X50' building to house my dream layout."

The QA&P was absorbed into the BN, but Tom's assuming it kept its identity to a degree as part of the Frisco.

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

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2. *MRH* forum member **cboyan43** posted his experiments trying to model a fall cornfield. Nicely done!

Growing corn

MRH forum member **cboyan43** (Chris B.) posted his experiments with trying to model a cornfield in the fall at the end of the season:

"I am modeling 1923 fall in southern Ohio. I looked at the fields in my area and saw a variety of colors, but I didn't see bright green. I didn't like the idea of painting the corn cobs yellow. All the corn I ever bought was still covered by the husk and green.

"I didn't like the all brown either. We already have another module with the all brown corn and they are harvesting it. So I went with the mixed green-brown color."

Follow Chris' progress by reading the full thread.

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



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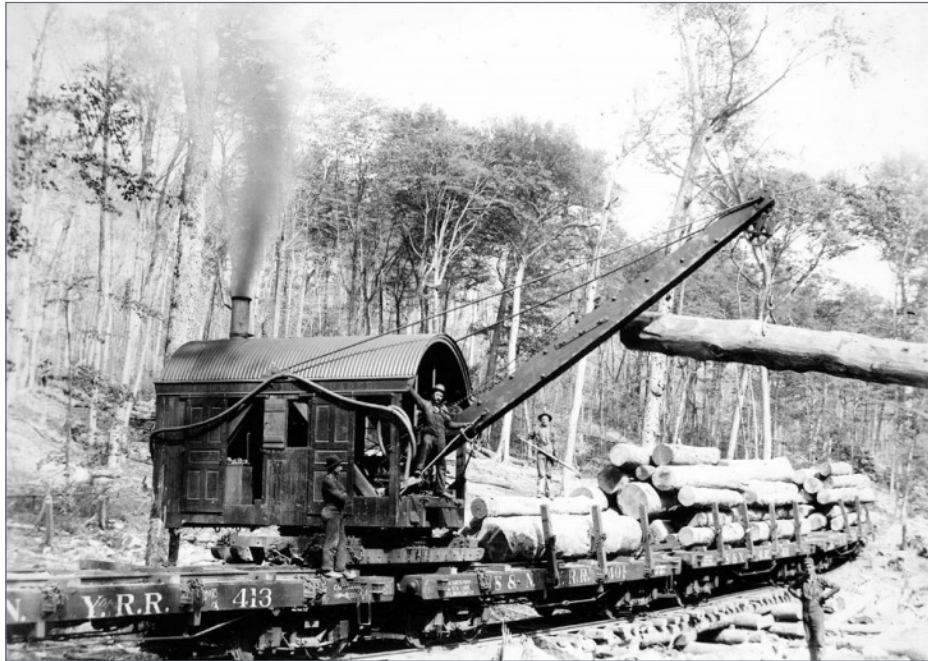
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3. *MRH* forum member **kjd** (Paul M.) has a number of questions about rail-carried steam shovels like the one shown above.

Steam shovels?

MRH forum member **kjd** (Paul M.) posted a link to a silhouetted photo of several steam shovels and wondered if they were rail-carried. One of the forum members replied with a caption from lower down on the page:

"These are maintenance-of-way shovels of the Chicago, Burlington and Quincy Railroad, used to clean along the tracks. Instead of caterpillar treads they have small wheels that allow them to run on rails placed on the flatcars so that they could move about while working."

Follow the entire discussion to learn more about these unique cars..

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

Monthly What's on your workbench thread

Once again, we're enjoying the recent monthly workbench thread. Here's a few choice projects from the December thread.

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

4. *MRH* Forum member and frequent *MRH*/TMTV contributor **Mountaingoatgreg** (Greg Baker) is doing some interesting work upgrading locomotives. He's installing decoders, then decaling and weathering several locos, one of which is shown here.



5. **UglyK5** (Jeff L.) is repainting and decaling several Walther's Trainline gons. They started out as a number of different roads but they're all being redone as FURX/NOKL/NDYX patch-out jobs. We love the interior weathering, suitably rusted and grimy, yet not a total rust bucket.



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Model Railroad Hobbyist | December 2022

KEN PATTERSON COVERS THIS MONTH:

- JENNY KIRK SHOWS 5" - AND 7.25" - GAUGE RAILROADING IN THE UK
- SETTING UP A ROSTER ON THE CS-105 WITH DAN MYCIO
- MODELING IDEAS FROM ABOVE WITH DAN SCHEIDELL
- KR MODELS PHOTO SHOOT
- BACHMANN'S NEW EZ-COMMAND PLUS DCC SYSTEM



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PHOTOS AND VIDEO OF SUPERB MODELS

THIS MONTH JENNY KIRK TAKES US TO GILLING, the location of a large 7.25"- and 5"-gauge railroad club, Dan Mycio demonstrates how to set up a roster entry on the TCS CS-105 command station, and Dan Scheidell takes us railfanning with Modeling Ideas from Above. Ken Patterson shows KR Models upcoming Shay locomotive and the British GT3 steam turbine. Closing out the show, Larry Harrington joins Ken to demonstrate the new EZ-Command Plus DCC system from Bachmann.

7.25"-and 5"-gauge railroading in the UK



1. Gilling, North Yorkshire is the home of a large-scale railroad system.

in the **DECEMBER 2021 MRH RUNNING EXTRA!**

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2. Jenny explains how large-scale modeling is not just the locomotives, there are a lot of freight cars to run prototypically.



3. Some of the modelers perform yard operations.



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4. Other modelers run on the mainline and enjoy the scenery.



5. A large C-C locomotive takes a ride on the manual dual-gauge turntable.



6. Ken and Dan discuss the new TCS CS-105 DCC command station.



7. Dan demonstrates the locomotive Settings menu.



8. A descriptive name can be assigned to the locomotive through the throttle.



9. Re-selecting the locomotive brings up the new name.



10. Dan also pointed out some of the other menu items on the Settings menu.

Modeling ideas from above



11. Dan Scheidell shows some clips of his favorite drone footage.



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12. Dan then followed a BNSF unit grain train with both mid-train and trailing DPUs along the Oregon Trunk Line.



13. The train climbs through the stark Central Oregon spring scenery.



14. Under a clear Missouri sky, Ken photographs a sample of the upcoming KR Models HO scale two-truck Shay locomotive.



15. With some backdrops added, it's easy to visualize what the locomotive will look like on the modeler's layout.





16. Ken also photographed the KR Models OO scale (1:76 on HO track) GT3 steam turbine locomotive.

Info: www.krmodels.net

Bachmann E-Z Command Plus



17. Bachmann's Larry Harrington joined Ken via Skype to demonstrate the new Bachmann E-Z Command Plus DCC system.



18. The new controller includes a visual speed indicator, an encoder knob with 128 speed steps, and paged function buttons for all 28 functions.

Info: bachmanntrains.com

To see the full video of large-scale modeling in Gilling, UK; Dan Mycio's command station training, Dan Scheidell's full Modeling From Above video, the KR Models photo shoot, and the new E-Z Command Plus, click on the video link at the beginning of the article. ☒

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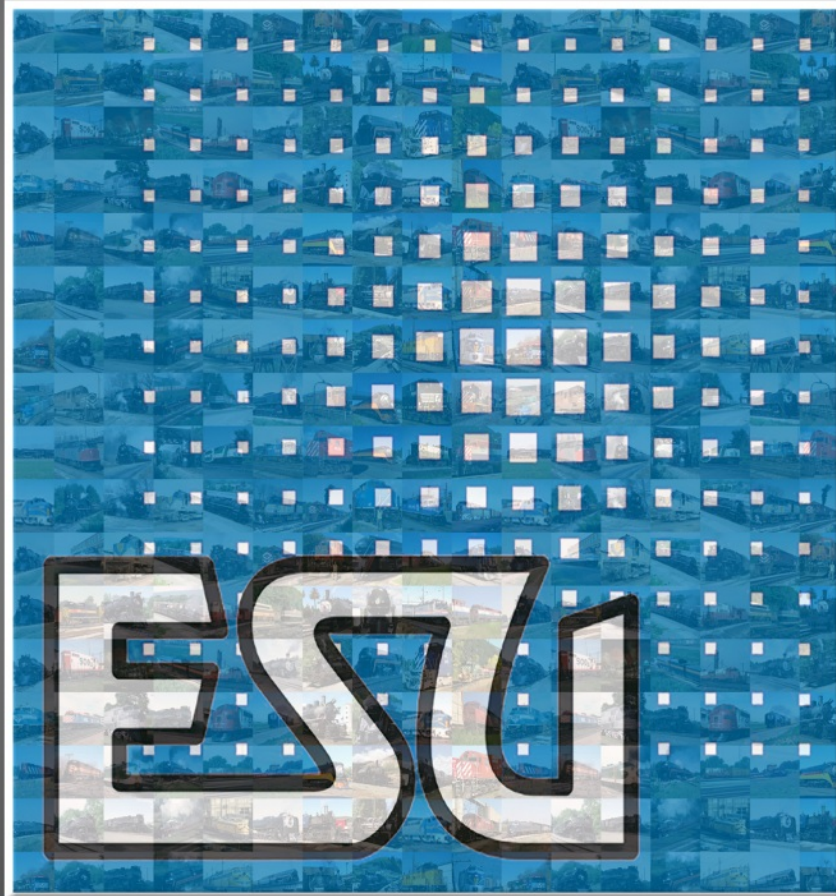
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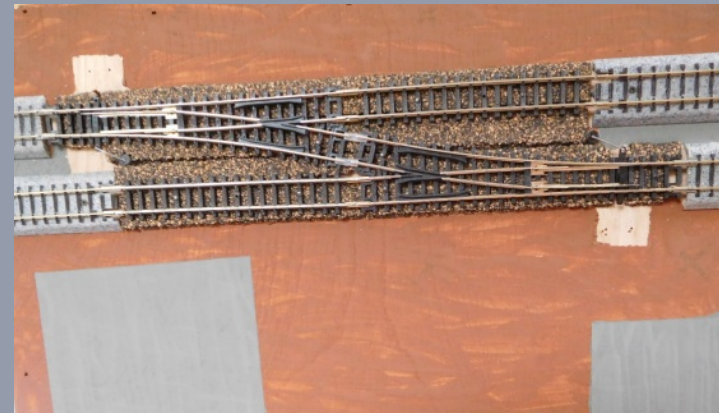
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Servo driven crossover



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Model Railroad Hobbyist | Dec 2022



BRIAN KING DEMONSTRATES HIS T-TRAK CROSSOVER MODULE ...

OUR CLUB, FUNTRAK, recently built a pair of N scale T-TRAK junction modules that separate the outer and inner tracks so the inner track can cut across the layout. Another pair of accompanying transition modules return the outer track to the double track standard to continue around the loop, effectively creating a main track with a passing siding.

A club member suggested a module placed between the junction and transition modules could provide an industrial siding. This originated the concept for a crossover module.

To make this module as reliable and independent as possible, we used Atlas turnouts, actuated with microcontroller-activated



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SERVO DRIVEN CROSSOVER | 2

servos. We used a voltage regulator for the circuit so it can run from any power supply that provides at least six volts.

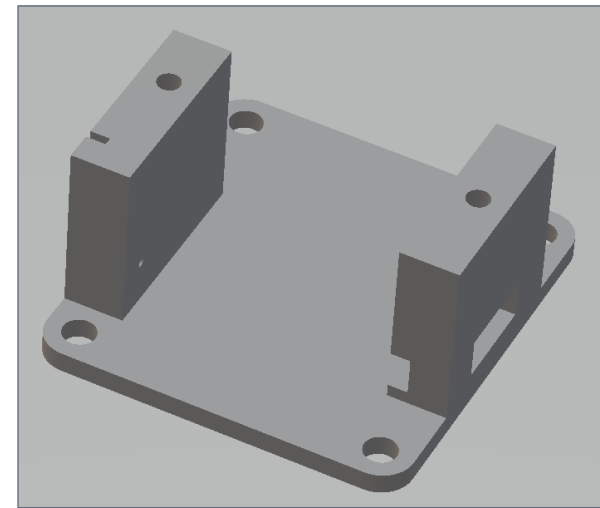
A pushbutton operates the apparatus. Push the button once and the crossover turnouts operate in unison to the opposing position. Push the button again and the turnouts return to normal.

A red/green LED indicates the toggling, with green for normal and red for reverse. The LED remains on for two seconds before the circuit shuts off.

COMPONENTS

The mechanical portion of the module requires several 3D-printed parts, shown in photos [1-9]. You will need access to a computer and 3D printer for these parts.

You can find .stl files for these 3D printed parts in [this month's bonus downloads](#).

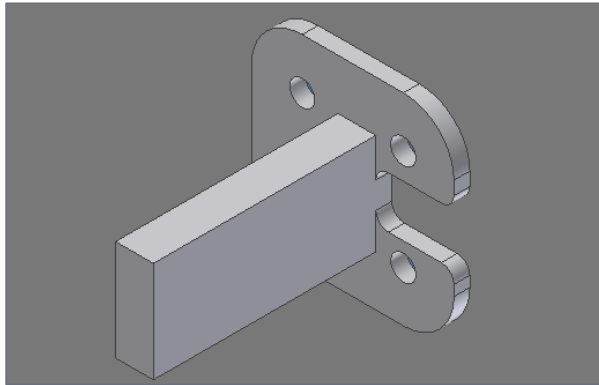


1. Crossover bracket to hold the servo motor. The servo motor's wires go through the hole at right.

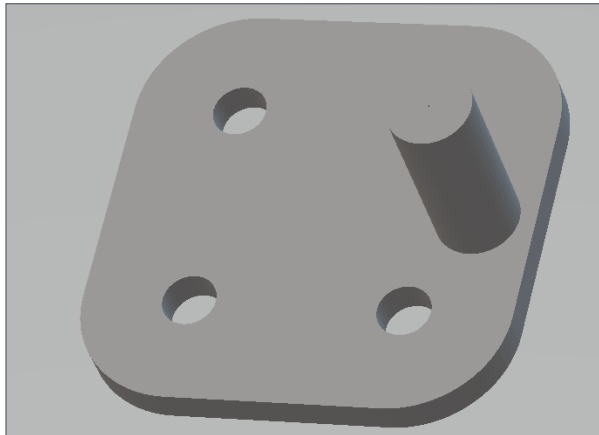
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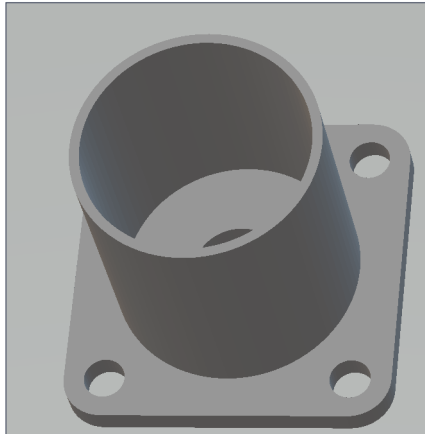
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2. Turnout support pivot bracket.



3. Turnout pivot bracket.



4. Pushbutton mounting platform and enclosure.

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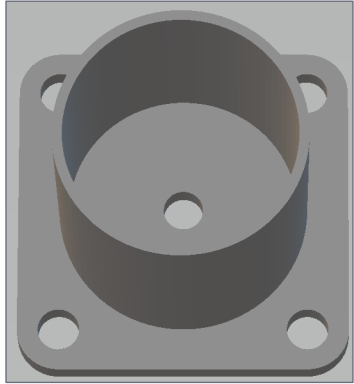
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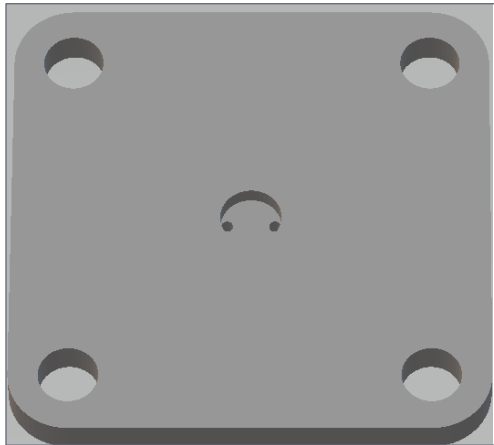
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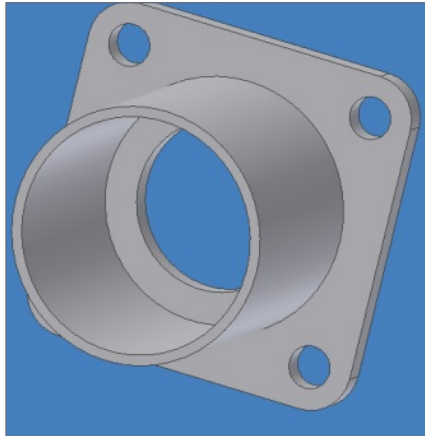
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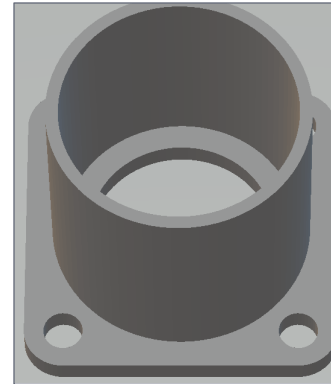
5. Indicator LED holder.



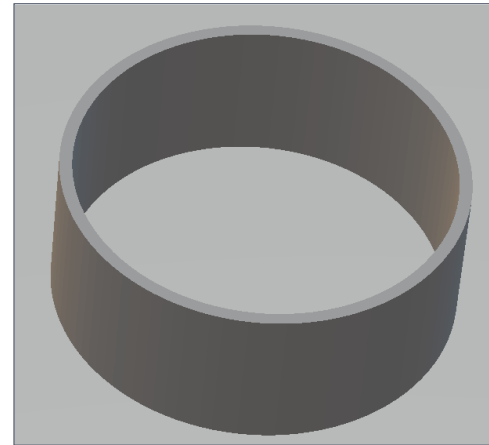
6. LED cover.



7. Power supply bracket.



8. Cinch-Jones connector insert bracket for track power.



9. Cinch-Jones lock ring.

The electronics include an Attiny 85 microcontroller, a 5-volt regulator, and supporting passive components to protect the circuit. We used an Arduino Uno and a breadboard to program the Attiny 85. Find the setup code for programming the Attiny 85 microcontroller here:

create.arduino.cc/projecthub/arjun/programming-attiny85-with-arduino-uno-afb829

These materials are inexpensive, reliable, readily available, and simple. When not operating, the circuit consumes no power, making it ideal for battery power. Using a plug for the power supply allows a choice for power.



SERVO DRIVEN CROSSOVER | 6

We used the following parts in the construction of this module:

1. Module frame
2. Two Atlas custom N line standard switches-right #2751 (or left #2750)
3. insulated rail joiners
4. metal rail joiners
5. Three Kato 62mm-long tracks
6. Length of Atlas flex track
7. Radio Shack experimenter board
8. Attiny 85 microcontroller (available from www.mouser.com)
9. 1/8" diameter Evergreen plastic tubing
10. 2-56 X 1/4" screws with nuts (2x)
11. 12" length of 0.032 music wire
12. 330-ohm resistor
13. 220 uF, 25-volt electrolytic capacitor
14. LM7805 voltage regulator, TO220 package
15. 1N4002 diode
16. T-1 3mm bi-color LED
17. Pushbutton switch
18. 3-pin header (to plug in servo)
19. 9G servo
20. Miscellaneous wires
21. DC power receptacle
22. Two Cinch-Jones sockets (S-302H-AB)
23. #4 X 3/8" wood screws (4x)
24. #2 X 1/4" wood screw
25. #4 X 1/2" flat head sheet metal screws (20x)
26. #4 X 3/8" Phillips head sheet metal screws (12x) available from www.mouser.com)

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- 27. #6 X ½" Phillips head sheet metal screws (2x)
- 28. Solder
- 29. Roadbed cork

You will also need a computer, access to a 3D printer, an Arduino Uno and breadboard to program the Attiny 85, and miscellaneous tools including a soldering iron. The electronic parts are available from Mouser, Digikey, or eBay.

The hardware is available at most hardware stores. The #2 screw can be found from The Bolt Depot (www.boltdepot.com) along with all the other mentioned screws if you need to order them.

TRACKWORK

With all the parts gathered, we can begin construction. Build a standard-length T-TRAK module to desired depth. *FUNTRAK* uses a 12-inch standard, but any depth that accommodates the cross-over at the proper location from the front of the module is acceptable.

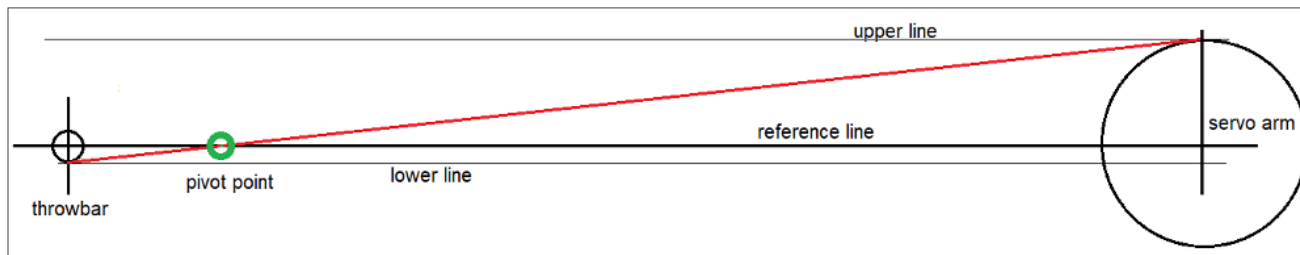
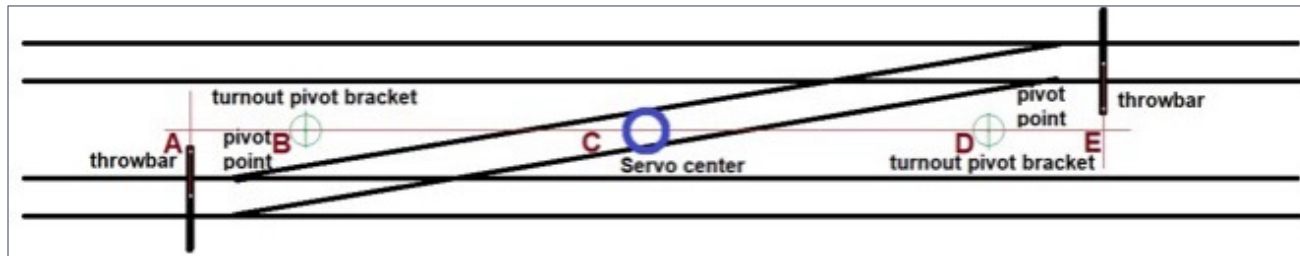
FUNTRAK's modules use standard 1 X 4 lumber, cut down to allow the overall module height to be the standard 2-3/4 inches. This robust framework allows easier transport of the modules when attached to transporting sticks.

To space the Atlas turnouts properly from the module ends, use a razor saw to cut a Kato 62mm track into two pieces: one 29mm long and the other 33mm long. These pieces provide the Kato joiner interface at the module ends.

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Remove the Kato joiners from the inside of the other two Kato 62mm track segments and use standard rail joiners to connect the Atlas turnouts. Solder feeder wires to the rail joiners at the cut ends of the Kato track to power the module [10].

Be sure to drill the holes for the feeders and run a test wire through before you fasten the track down. Also make sure you do not have any cork obstructing the turnout throw bar. This will be important when you are installing the drive wire for the turnout.



PLACING THE SERVO

Flip the module over for the next step to determine the servo center and the turnout pivot brackets' location. Plotting lines as in [11] and [12] will help.

With the pivot point determined, drill a 3/16" hole to mount the 3D-printed turnout pivot and support brackets. The post on the bracket must be the combined length of the thickness of your

10. (Top left) This diagram shows how the tracks fit together.

11. (Middle left) To find the center point for the servo, determine the center line between the tracks, at a point exactly halfway between the turnout throw bars. The distance from the center point of the throwbar (A) to the center point of the servo (C) – NOT the servo arm – will be the length of the actuating rod. The distance from the center point of the throw bar (A) to the pivot point (B) will be where to drill a hole for the actuating rod.

12. (Bottom left) Diagram for finding the pivot point (point (B) from [11]). The vertical line on the left represents the throw bar, and the vertical line on the right represents the servo arm. The lower line is 0.040" below the reference line, and the upper line is 1/2" above the reference, the length of the servo arm. The red line extends from the intersection between the upper arm and the servo arm to the intersection between the throw bar and lower line, and the intersection of the red line and reference line is the pivot point.

module top, the cork roadbed, and the atlas throw bar – FUNTRAK's total was 0.425". The hole through the center of the post should be 0.032" in diameter.

The servo should be mounted perpendicular to the reference line, with the "switch" wire cutout at the bottom.

SETTING THE ACTUATING RODS

Since the actuating rod will have bends on both sides of the turnout pivot bracket, it will be bent on one side first, inserted through the turnout pivot bracket and then have the remaining bends finished.

Make the first bend about one inch from the end of the 0.032" music wire actuating rod. This bend should be around 1/8" post into a U-shape. This will give you a U with one leg about one inch long.

Make the next bend at the pivot point, determined by subtracting the distance from the throw bar center point to the pivot point from the total length of the actuating arm. Measure this distance on your actuating arm from the top of the U.

With the U on a flat horizontal surface, bend the actuating rod up 90 degrees. Insert the actuating rod up through the turnout pivot bracket.

The next bend is at the sum of the length of the turnout pivot bracket post and the distance from the bottom of the module to the lower surface of the servo arm. Mark the location on the actuating arm, insert the arm in the turnout pivot bracket, and place the assembly on a flat surface. Using two pairs of pliers, bend the actuating arm 90 degrees at the mark.

Your actuating arm should now be a straight arm with the U at one end, a bend in the middle where the arm passes up through the turnout pivot bracket and another bend back down resulting in a straight arm with a vertical rod through the turnout pivot bracket.

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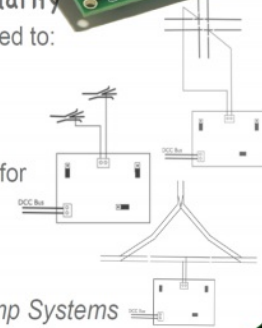
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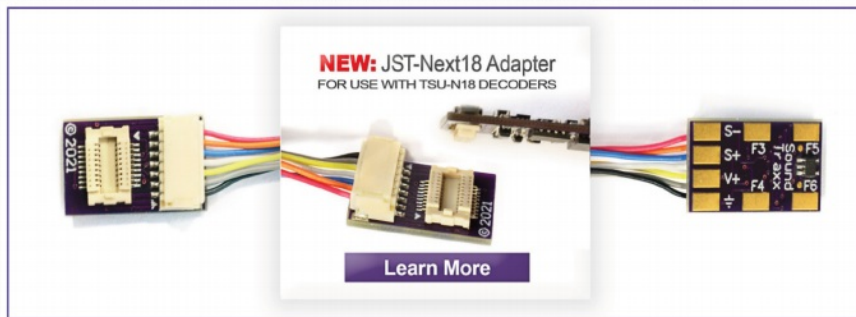
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SERVO DRIVEN CROSSOVER | 11

Make the final bend at a distance equal to the length from the center of the throw bar to the pivot point. Mark this distance on your actuating arm and bend the arm down 90 degrees. Cut the end for this rod to be approximately 1/8" long. Since we are using two turnouts, you will need to make two of these assemblies.

ASSEMBLING THE SERVO MECHANISM

Gather the servo, associated screws, arms, and the 3D-printed servo mount. Feed the servo wires through the opening in the top of the servo mount. Attach the servo to the mount with the servo screws that come with the servo.

Select the double-ended arm and push it onto the servo. Turn this arm from lock to lock on the servo to determine the center of servo travel. Set the arm in this middle position.

If the arm is not vertically in line with the top of the servo where the wires exit the mount, remove it and replace it so it is. Attach the arm retaining screw to keep the arm in place.

Find the two 2-56x1/4" screws and nuts. Take the Evergreen 1/8" plastic tubing and a #43 drill bit and ream out the tubing for approximately 1/2". Cut off two 1/8" lengths of reamed tubing with a sharp single-edge razor blade.

Using the same drill bit in the pin vise, ream out the holes in the servo arm that are 1/2" from the center of the servo. Now insert the 2-56 screw up through the arm through the hole you just reamed, place one of the 1/8"-long tubing pieces you made over the screw and put a nut on the screw. Tighten this nut just enough to hold the post assembly together without crushing the tubing [13].



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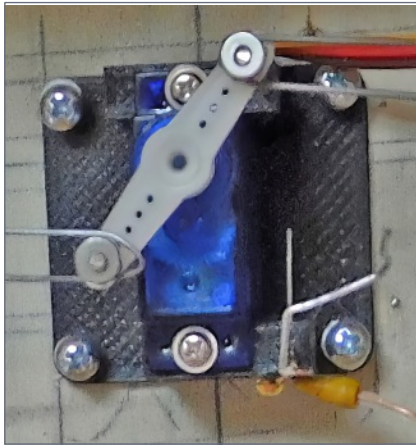
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13. This servo is in one of the “thrown” positions with the switch in open. The actuating wire at top rotates clockwise to contact the pickup wire at the bottom of the servo mount when in the opposite position.

Make a pickup wire to fit your servo mount and contact the actuating wire when in the closed position. To attach the wire connecting the “switch” to the electronic circuit, drill a #50 hole on the inside of the post where the pickup wire is [14].

Attach a small eyelet terminal to the connecting wire, and use a #2 brass wood screw to fasten the eyelet onto the post so it contacts the pickup wire and secures it to the post. Solder the connection.

Install the servo mount assembly under the module. Find your center reference line between the parallel tracks, and mark the center point between the turnout throw bars to place the servo.

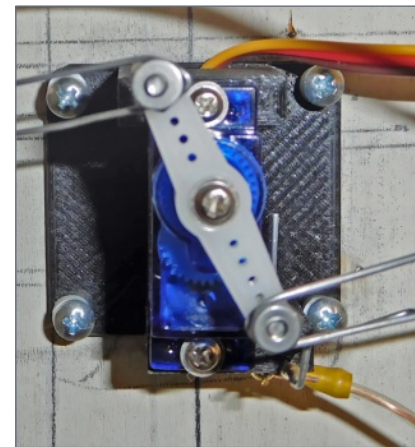
With the servo arm in the center, vertical position on the servo, attach the servo mount to the module the #4 by 3/8” Philips-head sheet metal screws. Use flat washers under the screws to avoid the screws protruding through the top of the module.

Once you have the servo mount attached, work each turnout pivot bracket with attached actuating wires up through the pivot point holes on the module. With some manipulation, the actuating wires should go in place and the bracket should fit firmly into the hole.

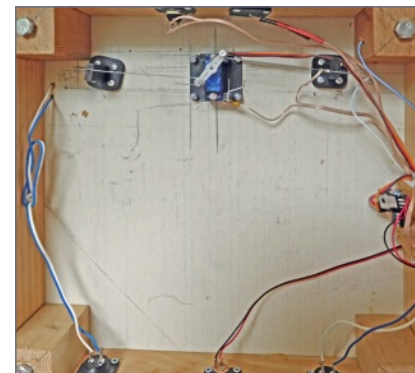
Screw the turnout and pivot support brackets into the module using #4 by 3/8” Phillips head sheet metal screws. Align the

actuating wire with the turnout throw bar holes and push into place.

Place the U-shaped end of the actuator wire around the servo arm post, place the turnout support pivot bracket under the actuating wire and over the turnout pivot bracket, and secure in position with four #4 by 3/8” Philips head sheet metal screws. Do this for both turnouts to complete the mechanical installation [15].



14. Here the servo is in the opposite position as [13], with the actuating wire contacting the pickup wire.

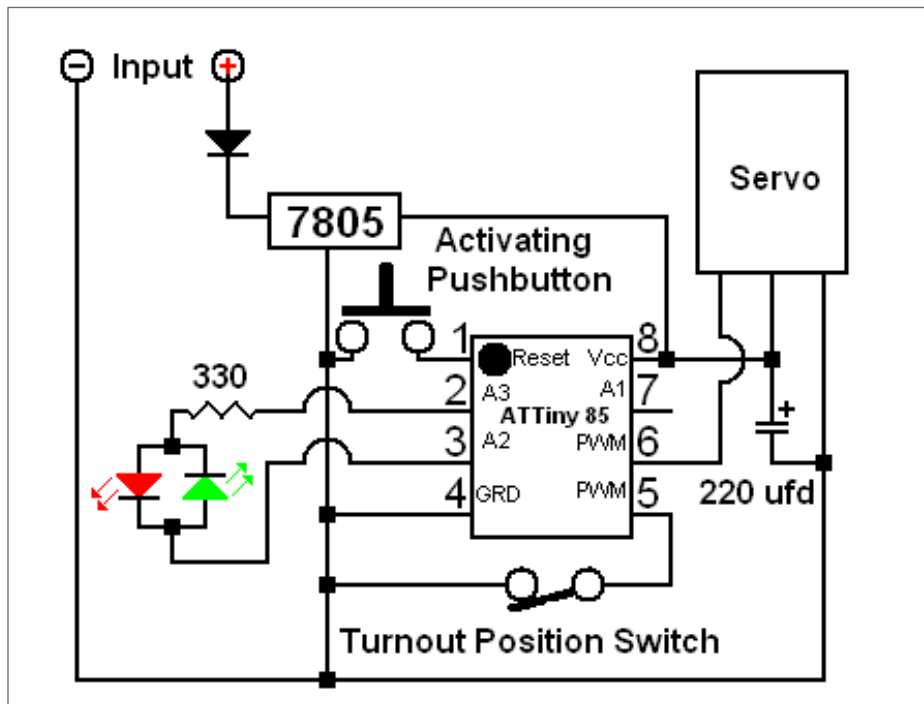


15. The completed installation from the underside of the layout. The front of the module is at top, with the push-button switch at top right and the indicator LED at top left. The logic board is at center right.

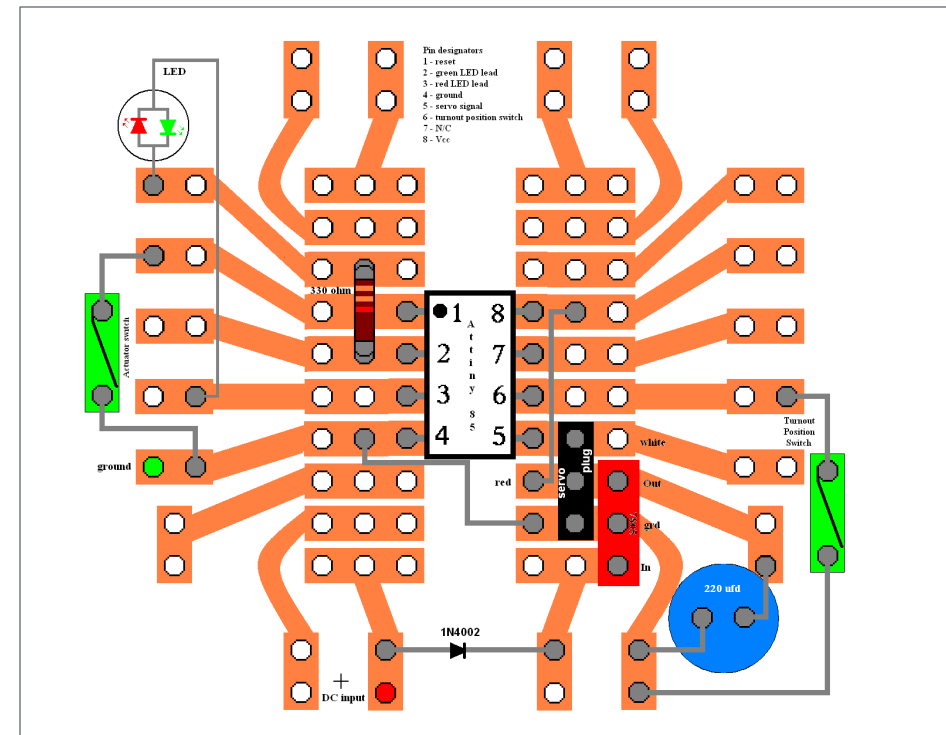
ELECTRONICS INSTALLATION

Our project uses an Attiny 85 microcontroller. This chip costs approximately \$1.25 and is easily programmed using an Arduino as the ISP (In-System-Programmer). With a few additional parts, the circuit drives the servo and the LED indicator from a choice of power supplies from a 9-volt battery to an auxiliary input from a power pack.

The controller changes the direction of the turnouts each time the push button is pressed and then turns off, conserving power. The circuit schematic is shown below as well as a diagram for constructing the circuit on a Radio Shack experimenter board [16, 17].



16. Circuit schematic for crossover turnout control.



17. Radio Shack experimenter board schematic.

The components are installed on the non-foil side of the board and soldered on the foil side. I recommend a socket for the Attiny 85 IC chip.

FUNTRAK's installation included a power receptacle for a wall wart or a 9-volt battery with a power plug attached. We installed the receptacle using a 3D-printed power plug bracket [7]. This made connecting power to the module from various sources convenient.

We also installed the two-part LED bracket [5, 6], the push button bracket [4], and Cinch-Jones-compatible brackets [8, 9]. We secured each of these brackets to the module frame with #4x1/2" Philips-head sheet metal screws. We attached the

Radio Shack experimenter board with all components installed to the module frame using the same screws, but with four spacers to prevent the screws from protruding through the top of the module.

PROGRAMMING

The program to operate this project is called `Attiny_crossover_program.ino`. This is an Arduino program that we will write to an Attiny 85 microchip to run this system. The program has many remarks to tell what is going on throughout the program, but here is a short description of the sequence of events.

When first powered up, the program checks to see what position the turnouts are in. This is determined by the actuating switch on the arm of the servo driving wire. When the program determines the positions, it energizes the bi-color LED indicator, green for normal, red for reverse.

After a short delay, the program activates the servo to move the turnouts to the opposite position from where they started. After the turnout reaches its opposite limit, it stops. The actuating switch will now be in the opposite condition from when it started, either opened or closed, and the program changes the output to the bi-color LED indicator to reflect the new turnout position.

After a two second delay, the program shuts down. Pressing the actuating push button resets the program and it cycles through the setup again, changing the turnout position to the opposite position. The microcontroller remains in standby if power is applied, but draws minimal current. The program is available here, along with the .stl files for your 3D printer:

[\(Get December 2022 bonus downloads here\).](#)

With everything connected and programmed properly, your crossover turnouts will alternate position with each press of the

actuating push button, and the bi-color LED will indicate the turnout position for a short time before turning off. ☑

BRIAN KING



Brian's grandfather worked on the New York Central Railroad for over forty years. He had an HO layout that fascinated Brian when he was a youth in the early fifties. This interest has carried on over the years.

As he traveled through life raising a family and pursuing his careers, model railroading continued to be a good pastime and a fine way to meet people. He made one career of the U.S. Navy from 1969 to 1992. Following his retirement from the Navy, he went on to teach school, and retired from his second avocation in 2013.

After retiring from the Navy, he started a model railroad club, **FUNTRAK**, in Frankfort, New York. The club is quite active to this day, and he is still the president.

Other interests include some travel, electronics, computers, classic cars, and 3D printing. He is currently single with four grown children and several grandchildren. ■

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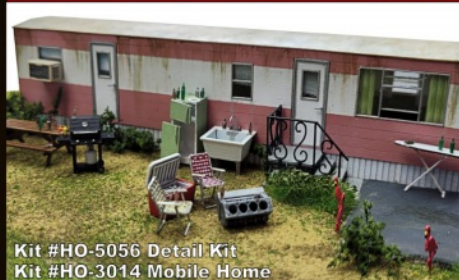


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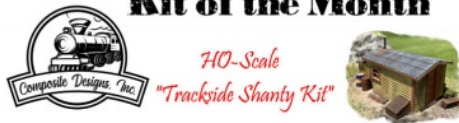
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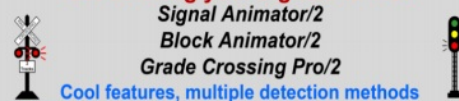
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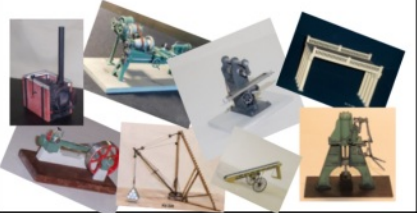


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A MODELER'S GUIDE TO PASSENGER CAR TRUCKS OF THE 20TH CENTURY



RICHARD BALE PROVIDES A
COMPREHENSIVE REVIEW OF TRUCK
EVOLUTION ...



EXCEPT FOR THE BODY, the largest, heaviest, and most expensive components of a railroad car are the trucks. Since they incorporate the braking system, the trucks also represent the most important safety feature on a car.

Prior to Reconstruction following the Civil War, freight and passenger cars rode on trucks that were similar and often identical.

With the introduction of heavier passenger cars and increased train speed, car builders began to address the need for specialized passenger trucks to provide a safer, more stable ride. Six-wheel trucks seemed to be the answer.

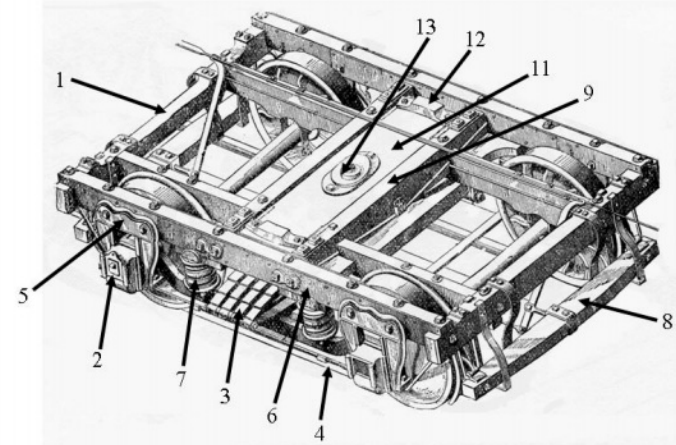
Spreading the weight over 12, rather than eight, wheel bearings on a longer wheelbase was thought to impart less motion to the car and theoretically provide a smoother ride. Improved safety was also expected since brake shoes could be mounted on 12 wheels.

In addition to longer wheelbases and more wheels, among the early innovations for passenger trucks was the introduction of swing hangers and equalization. More about that later.

WOOD FRAMES

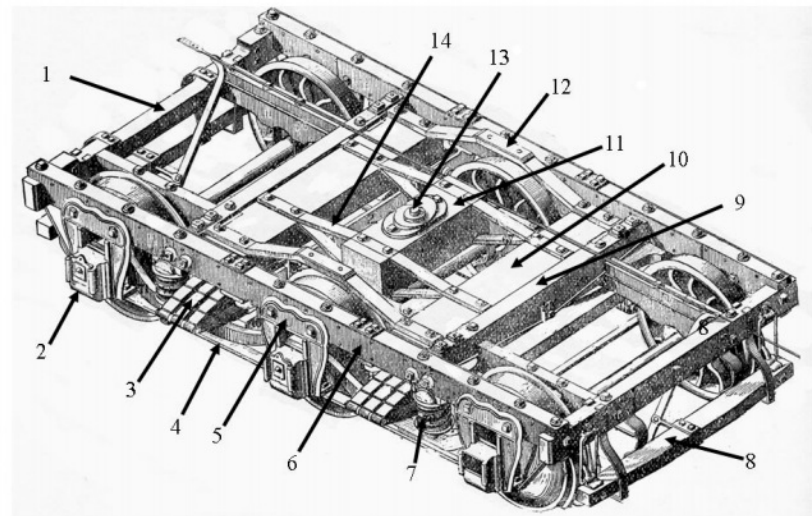
Late in the 19th century, most passenger car trucks were built with hardwood frames [1]. By the 1890s, composite construction was standard. Rods and iron flitch plates sandwiched the timber frame to strengthen it. Cast metal pedestals were bolted to the timber frame to support the axle and journal box [2].

Four-wheel wood framed passenger truck—Circa 1880



- | | | |
|-----------------------------|--------------------|------------------------|
| 1 Wood frame end sill | 6 Wood frame | 11 Center bearing beam |
| 2 Journal box | 7 Equalizer spring | 12 Side bearing |
| 3 Elliptical bolster spring | 8 Brake beam | 13 King pin |
| 4 Equalizer | 9 Transom | 14 Side bearing bridge |
| 5 Cast pedestal | 10 Spring beam | |

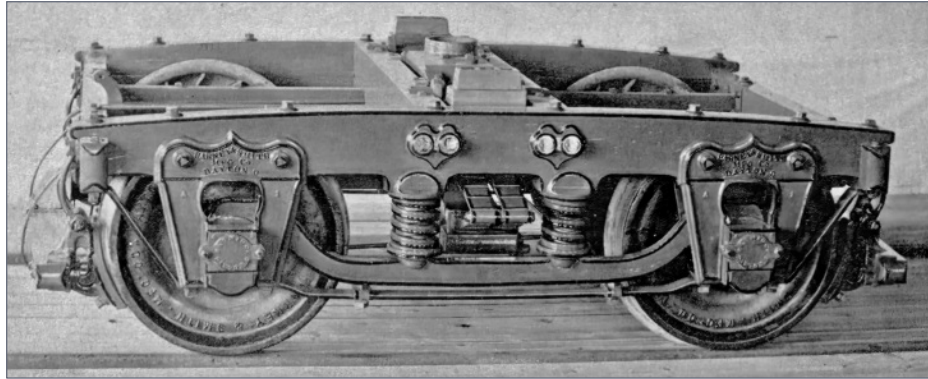
Six-wheel wood framed passenger truck—Circa 1880



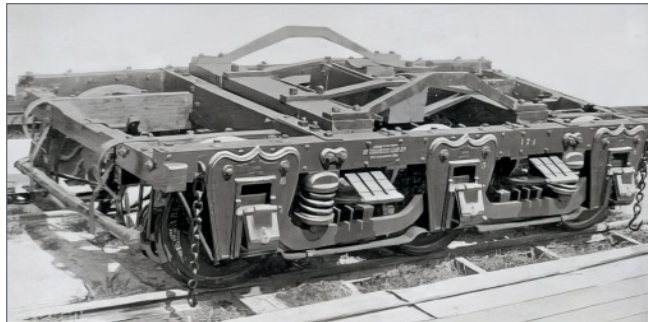
1. Schematics for early two- and three-axle wood frames.

FABRICATED STEEL FRAMES

By the late 1890s, passenger cars had grown to such proportions that wooden-beam trucks were inadequate and unsafe. Around the turn of the century, builders began using rolled channels and plate steel to fabricate passenger truck frames. Most of the other components, including the bolt-on pedestals, remained the same [4, 5].

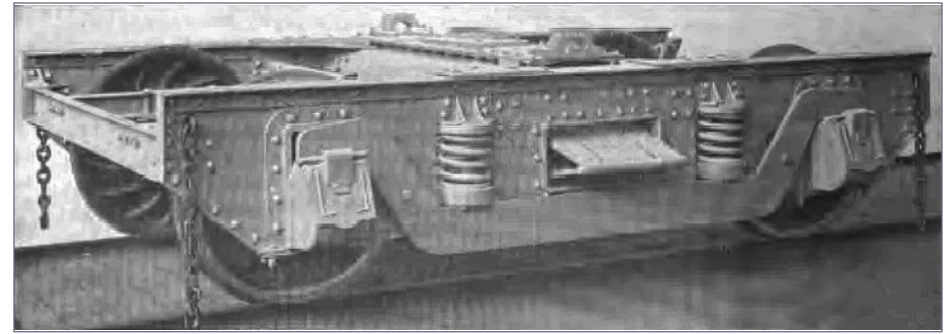


2. This wood-framed truck from the early 1890s has a two-section elliptical bolster spring, drop equalizer with coil springs, and cast pedestals bolted to the side frame. Below the equalizer is a stabilizing pedestal tie-bar.

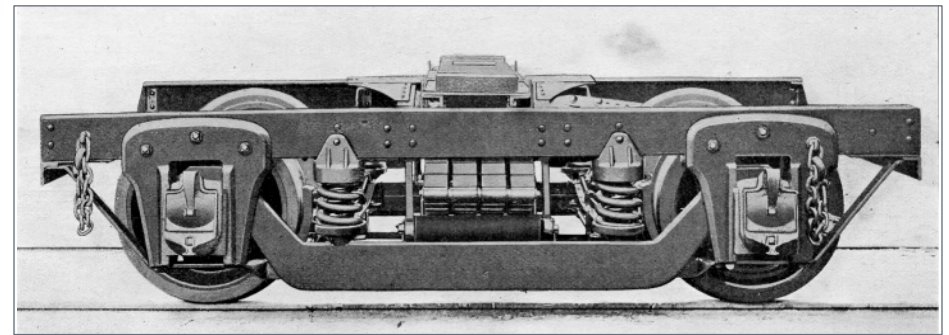


3. This six-wheel wood-framed truck from the 1880s has separate cast pedestals that held the vertically sliding journal boxes. The tie bar,

visible below the drop equalizers, links and helps stabilize the pedestals.



4. Barney & Smith produced this steel-fabricated truck in 1903. Note the outside drop equalizer.



5. The frame of this four-wheel truck from the transitional wood-to-steel car era was fabricated using a rolled-steel channel. The inside swing bolster hangers supporting a four-section elliptical spring package are visible along with bolt-on pedestals and an inside drop equalizer. ACF built this truck circa 1912.

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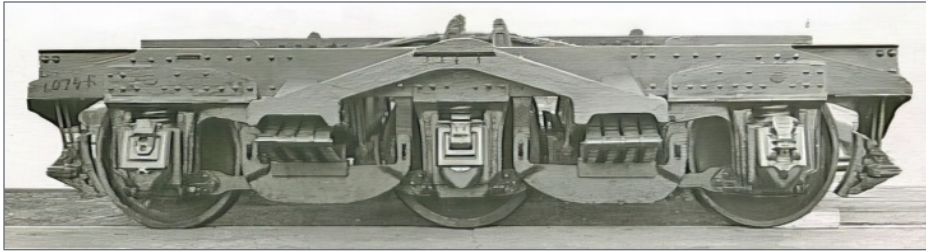
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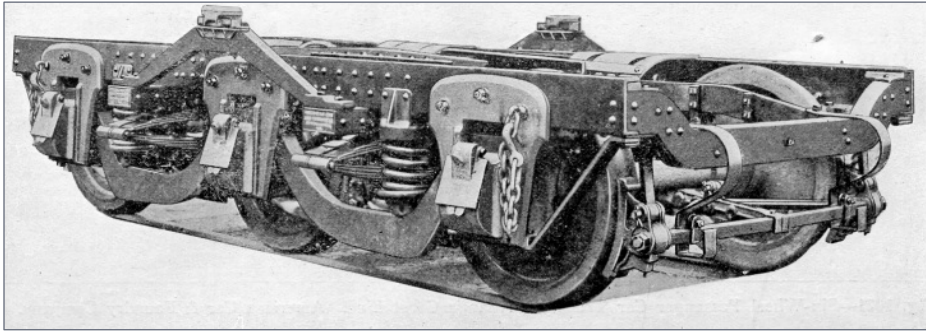
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6. The frame of this Pennsylvania Railroad class 3D-SP2 six-wheel truck from the early 1900s was built-up from steel shapes.

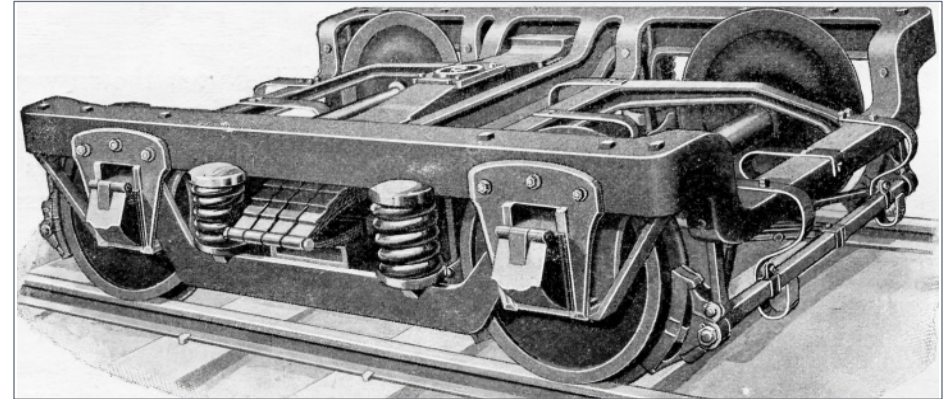


7. ACF constructed the frame of this six-wheel truck using rolled steel stock. Note the pedestals bolted to the channel frame, plain bearing journal boxes, drop equalizers, and car side-bearing brackets.

CAST STEEL FRAMES

In 1904, the Big Four Railway, a subsidiary of the New York Central, ordered four-wheel trucks with a one-piece cast steel frame for a group of baggage cars. A one-piece cast frame provided absolute rigidity; a guarantee that the frame would remain square and that the wheelsets would always run true. Cast frames were developed both with and without integrally cast pedestals; the latter allowing frugal railroads to recycle individual pedestals from older trucks.

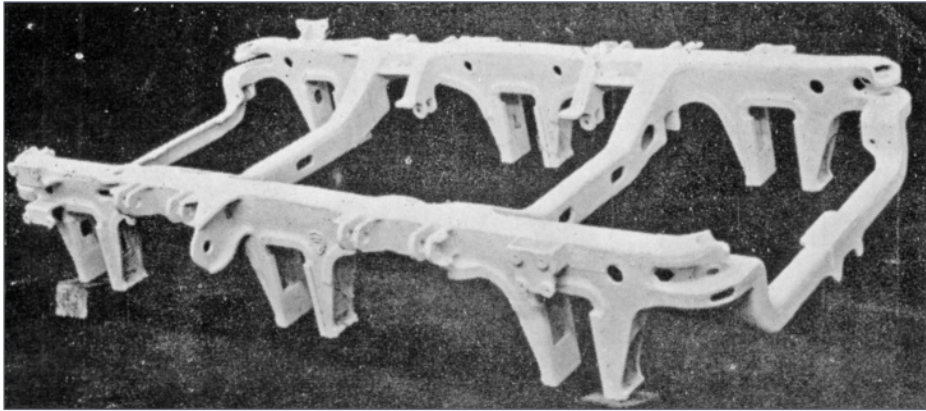
The 1907 introduction of the first production-model steel car signaled the end of wood-framed trucks on new passenger equipment. The steel-age introduced the use of new materials but did not alter the basic design of trucks.



8. A pre-WWI example of a one-piece cast frame with separately cast bolted-on pedestals. This four-wheel truck has four-section elliptical bolster springs and drop equalizers.



9. This Pullman six-wheel truck from the early heavyweight period utilized a one-piece cast frame with separate bolted-on pedestals. The looped strap-springs mounted on the dropped end sill support the floating brake beam.



10. A one-piece frame for a six-wheel truck with integrally cast pedestals produced by Commonwealth.

With cast steel frames, cast pedestals, equalizing bars, springs, spring planks, generators, wheelsets, and brake rigging; trucks became excessively heavy. The Big Four trucks weighed 6-1/2 tons each.

In the era of the heavyweight passenger car, the weight of four-wheel trucks had grown to 7-1/2 tons each, with six-wheel trucks weighing as much as 10-1/2 tons. Even in the lightweight era that began in the mid-1930s, trucks weighed nearly 10 tons each – amounting to one-third of the car's total weight.

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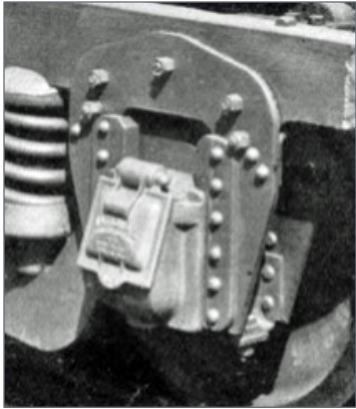
The Commonwealth Steel Company was established in Granite City, Illinois in 1901. Over the next several years it became the major supplier to the railroad industry of both simple and complex steel castings. In 1928 the Baldwin Locomotive Company and the American Locomotive Company, formed General Steel Casting Corporation (GSCC). The following year, GSCC acquired Commonwealth. GSCC continued to identify and market castings under the Commonwealth brand name. By the end of the 20th century, most of the nation's passenger equipment was riding on trucks produced by GSCC, or on truck frames cast by GSCC to customer specifications. Car builders added brake equipment, bearings, and various ride-control devices of their choice to the GSCC casting. This resulted in a vast array of hybrid trucks beyond classification.



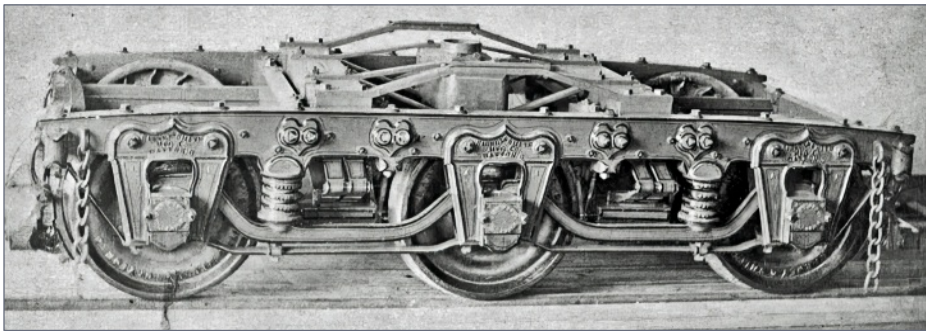
PEDESTALS

The pedestal holds the journal box in place horizontally but allows vertical movement. Individual pedestals, cast in the shape of an inverted letter "U", were bolted to the side member of the truck frame. The two downward projections of a pedestal are called legs, and the space between them a jaw, which is closed at the bottom by a pedestal tie bar [13].

With the development of the one-piece cast truck frame, the pedestal was integrally cast with the frame, which ensured truck alignment. To minimize wear by the constant vertical movement of the journal box, hardened steel liners are fitted to the inside of the pedestal jaw.



11. Closeup of a pedestal.



12. This six-wheel truck features individual cast pedestals bolted to the steel-clasped wood frame. Details include slender drop equalizers with coil springs, pedestal stabilizing bars below the equalizers, and car side-bearings. This truck was produced by Barney & Smith in the 1880s.



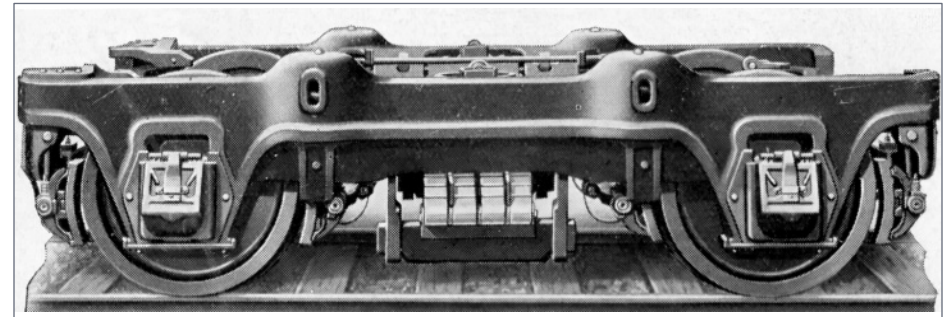
13. A heavy tie bar from the corner of the truck frame to the bottom of the pedestal helped stabilize bolt-on pedestals.

EQUALIZERS

A major advance in truck design introduced in the 19th century was equalization. A steel lever, or equalizer, connected the axles, so a bump received by one wheelset was transferred to and partially absorbed by the others. Although demonstrated in the 1840s, the equalizer was rarely applied before the 1870s, when it subsequently became a standard in truck design.

Three forms of equalizers became popular. Straight equalizers are mounted internally, and for modeling purposes are generally not visible [14]. An advantage to straight equalizers is easy access to brake shoes and other components for maintenance.

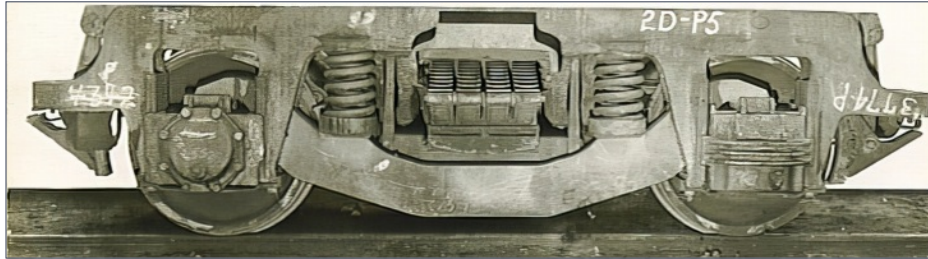
The most common type of equalizer is an inside drop equalizer [15]. Less common is a double outside equalizer, in which the outer member can be seen resting on the top of the journal box [18]. Drop or bottom equalizers on six-wheel trucks consist of a pair of dogleg members looped between the journals on each axle [24].



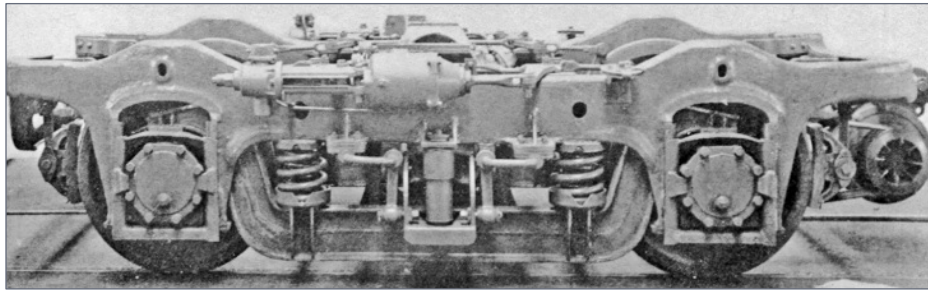
14. Built by GSCC in the late 1920s for heavyweight coaches, this four-wheel truck has straight equalizers hidden behind the frame. The two equalizer springs are housed inside the blisters on the side of the frame. Note the plain bearing journals, pedestal liners and the swing hangers supporting the four-section elliptical bolster spring.



Wheels, axles, bearings, and equalizers represent unsprung weight. To lighten them while still maintaining strength, some drop equalizers were forged with an I-beam cross section [16].



15. This Pennsylvania Railroad class 2D-P5 truck from the early 1930s has an inside drop equalizer. The brake beam is supported by the slightly extended end sill. Free-standing trucks show considerable open space above the journal box since they are not supporting the weight of a car.



16. To reduce unsprung weight, the equalizers on this all-coil truck were forged with an I-beam cross section. A Monroe automotive-style hydraulic shock absorber is in the middle of the truck. Pullman built the truck in the late 1930s for the Chicago, Milwaukee, St. Paul & Pacific Railroad.

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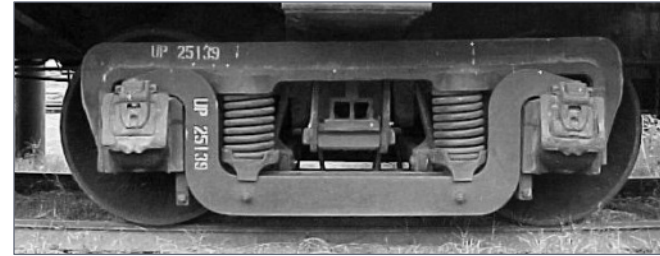
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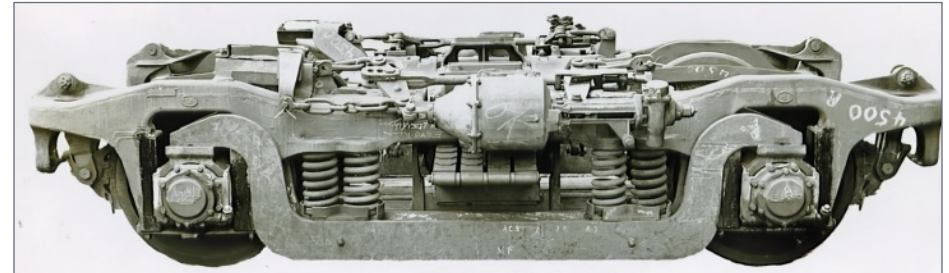
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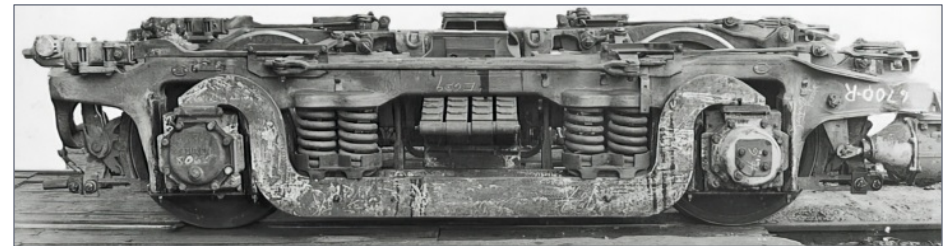
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17. Outside drop equalizer on a heavyweight Union Pacific truck with plain journal bearings.



18. This Pennsylvania Railroad class 2D-P6 truck has double drop equalizers with the outside member resting on the journal boxes. The air brake cylinder is mounted on the side of the truck frame. This truck was used on PRR's Keystone Tubular Train built by Budd in 1950.



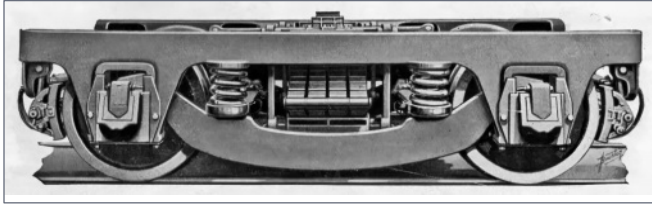
19. Pennsylvania Railroad class 2D-P7 four-wheel truck with outside drop equalizers was used on the Fleet of Modernism cars built in 1938. Due to clearance issues, some air brake cylinders were mounted on the end sill rather than on the side of the truck.

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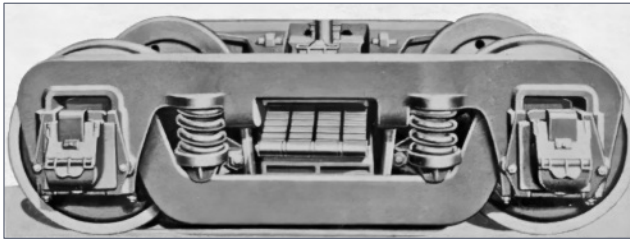
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FOUR-WHEEL HEAVYWEIGHT TRUCKS



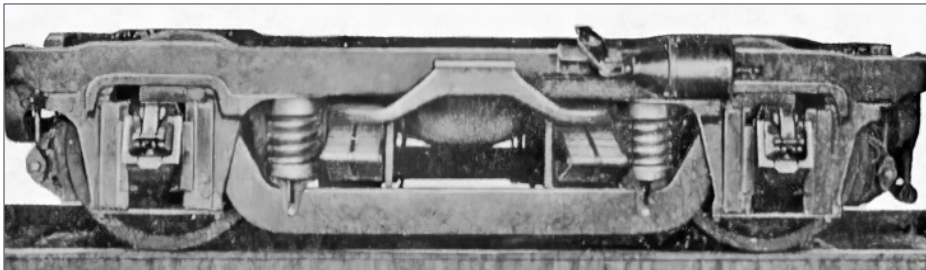
20. GSCC cataloged this Commonwealth four-wheel passenger truck in the late 1920s.

The clean design featured a graceful inside drop equalizer, integrally-cast pedestals, and plain bearing journals.

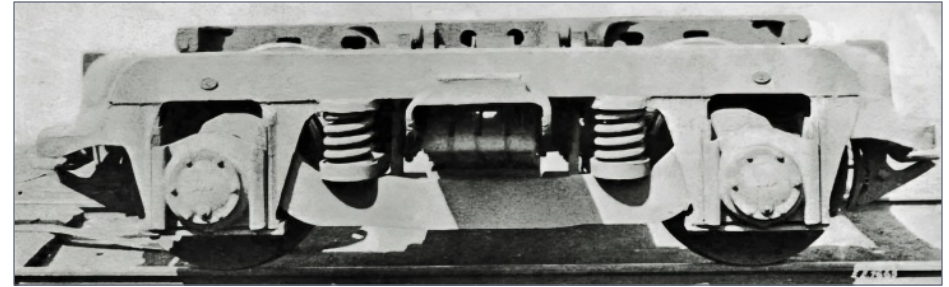


21. This basic four-wheel passenger truck from GSCC circa-1940 advertising material has plain-bearing journals, a

sizable inside drop equalizer, and four-section elliptical bolster springs suspended by inside swing hangers. This clean promotional image lacks any hint of brake components.



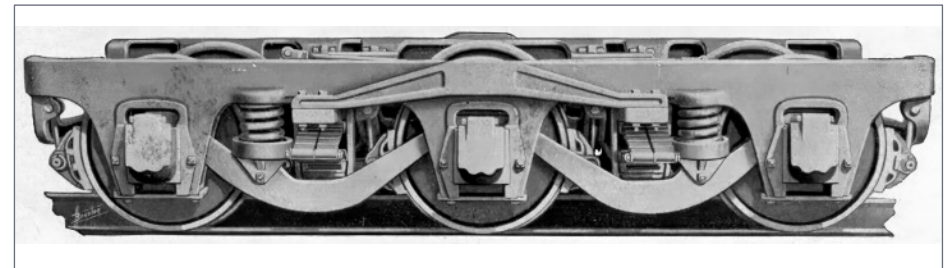
22. Heavyweight passenger trucks with plain journal bearings continued to be available into the era of lightweight cars. This image is from GSCC promotional literature dated 1940.



23. This Pennsylvania Railroad class 2D-P5 four-wheel passenger car truck is equipped with SKF roller-bearings.

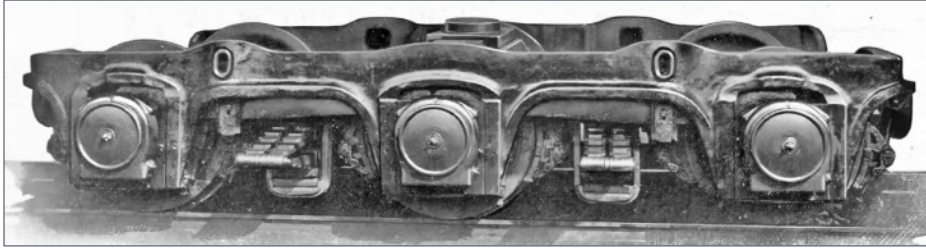
SIX-WHEEL HEAVYWEIGHT TRUCKS

The use of six-wheel trucks peaked during the era of heavyweight passenger cars. Though the trucks continued to be built in limited numbers, primarily for maintaining older equipment, they were rarely used on new equipment after 1935. There were some exceptions such as heavy diners and dome cars, including the Milwaukee Road's superdomes built in 1952.

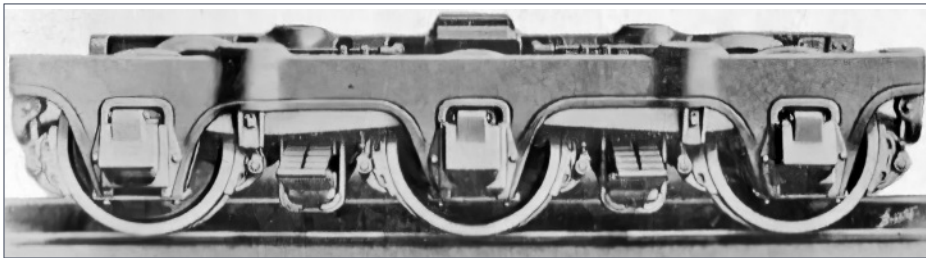


24. This classic Commonwealth six-wheel passenger car truck continued to be produced throughout the heavyweight era. Spotting features include a one-piece frame with integrally cast pedestals, fitted with plain bearing journal boxes, dogleg drop equalizers, coil equalizer springs, clasp brakes, and a car body side-bearing mounted outside the truck frame. GSCC continued to catalog this truck after it acquired Commonwealth in 1928.

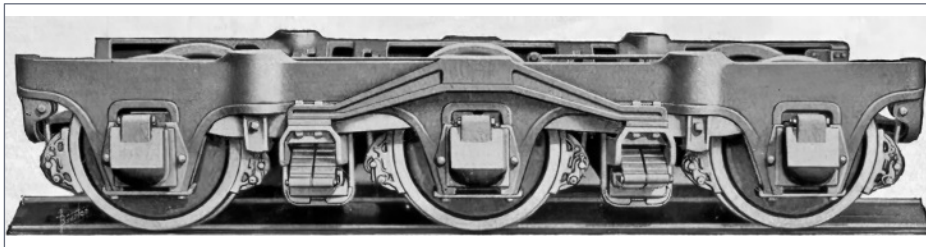




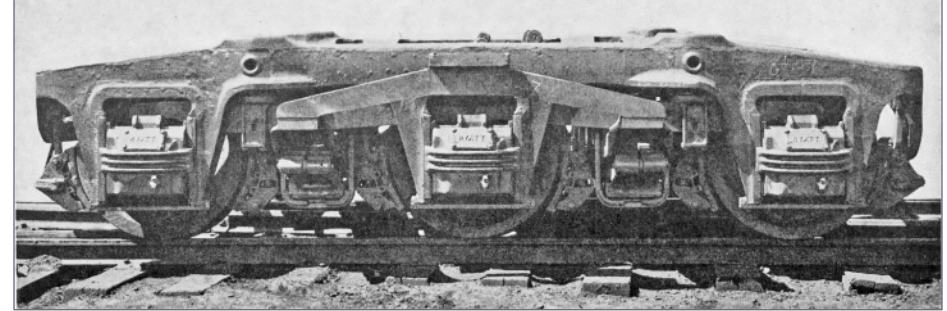
25. This six-wheel truck from the late 1920s has been fitted with a novel automatic journal lubricating system manufactured in Britain by the Isothermos Co.



26. The straight inside equalizers on this six-wheel heavyweight truck can be seen below the frame and above the elliptical springs. The equalizer springs are positioned behind the bulges in the side of the truck frame. Commonwealth offered this truck in the mid-1920s.



27. This is the same Commonwealth truck shown in [26] with a car-body side-bearing added.



28. This WWII-era Pennsylvania Railroad class 3D-P2 six-wheel heavyweight truck had heat-dissipating fins on the caps of the Hyatt roller bearings.

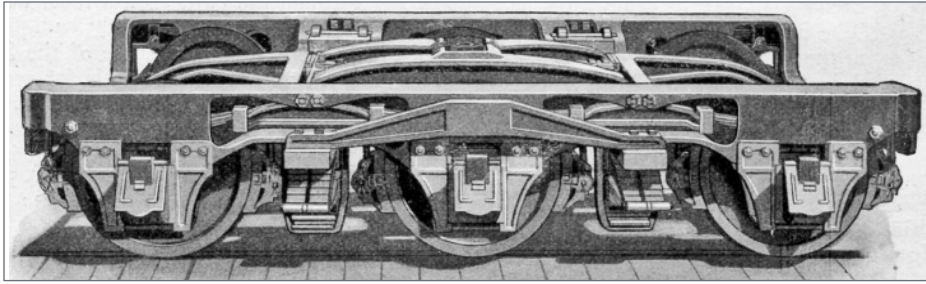
JOURNAL BEARINGS

Railroads were slow to apply expensive roller bearings to freight trucks since the cars would spend much of their time offline. That was not the case with passenger equipment, most of which operated on home rails. The actual conversion of passenger trucks to roller-bearings took an extended period, with cars regularly assigned to first-class name trains receiving priority.

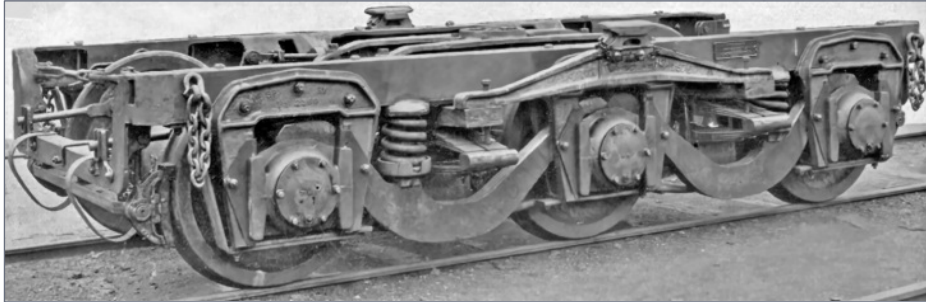
Among the first railroads to institute the change was the Pennsylvania, which began installing roller bearings in its heavyweight passenger equipment in the early 1920s.

Although most new passenger cars were built of steel, as of 1920 sixty percent of the existing American passenger car fleet was of wood construction. Until those cars were stricken from the books through attrition, most of them continued to ride on trucks with plain bearings.





29. This circa 1916 six-wheel passenger truck has plain journal bearings riding in independent pedestals bolted to the one-piece cast frame. Additional details include top equalizers, two-section elliptical bolster springs suspended from swing hangers, and a car side-bearing frame mounted on the bolsters.



30. An early example of SKF roller bearings is this Southern Pacific six-wheel truck from the 1920s. Note the individual cast pedestals bolted to the one-piece cast frame, drop equalizers, and outside car side bearings. The steel strap springs mounted on the end sill support a floating brake beam.

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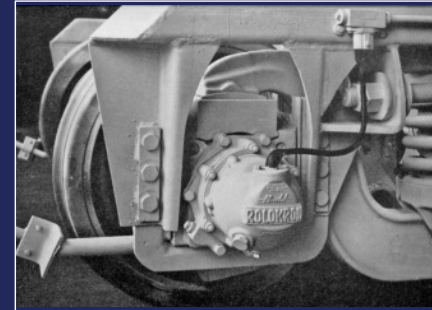


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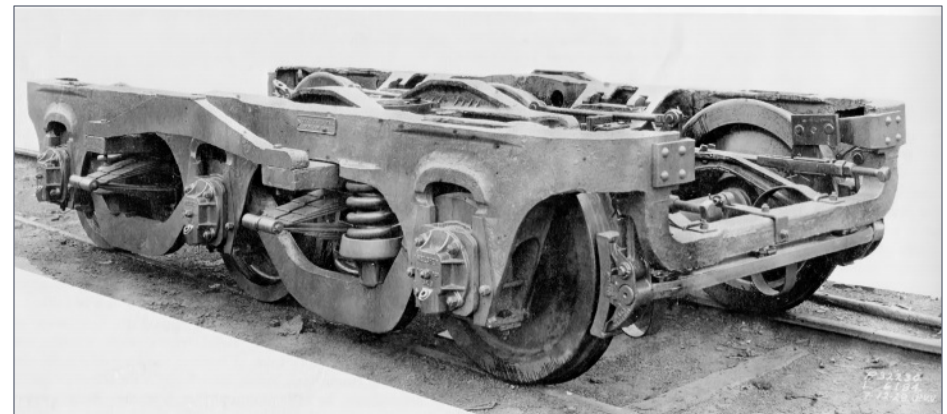
Rolokron unit.

JOURNAL CAP HARDWARE ADD ONS

Various devices were attached to journal caps including heat dissipators [28], automatic lubricating systems [25], and anti-wheel-slide sensors like this Budd Rolokron unit.



31. Rolokron anti-wheel-slide sensor.



32. The one-piece frame of this 1929 Pullman truck has integrally cast pedestals with roller-bearing journals. The strap springs supporting the brake beam are inside the dropped end sill.



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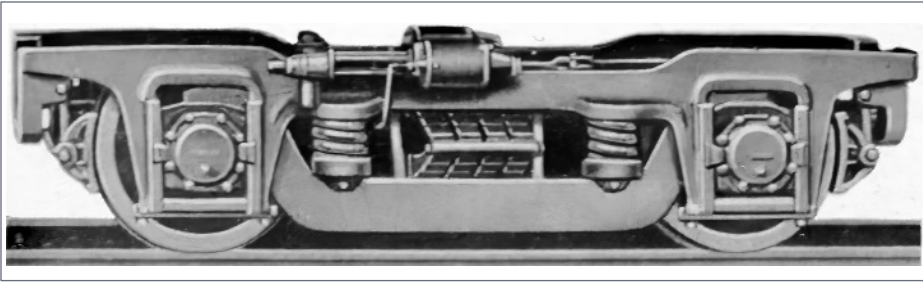
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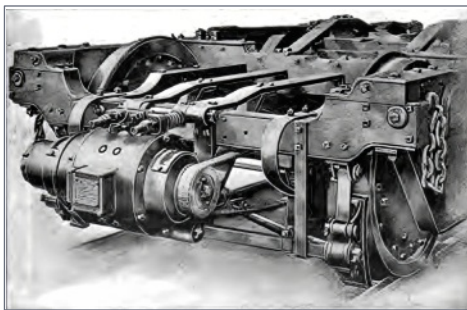


33. GSCC promotional material from the late 1930s included this Commonwealth four-wheel truck with roller bearings. The extended end sill of the cast steel frame provides convenient support for brake rigging. An air brake cylinder is mounted outside the one-piece cast frame.

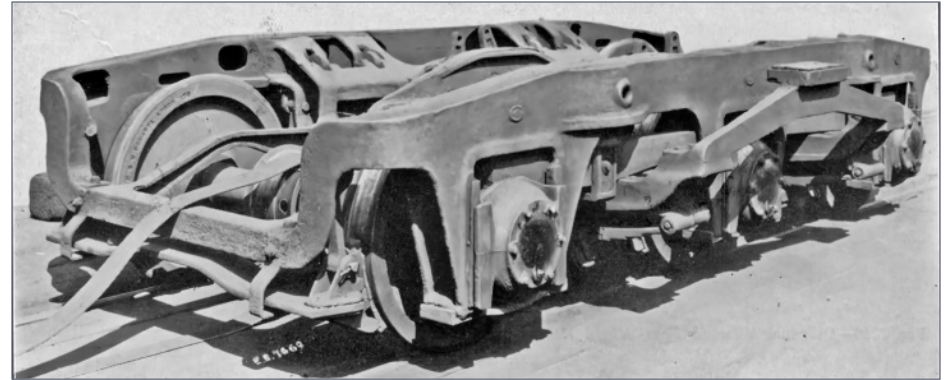
GENERATORS

Passenger cars require power for lighting and other appliances. Batteries supplied the power, and the cars' rotating wheels drove generators that recharged the batteries continuously.

Generators were mounted on the end sill of truck frames or to the underframe of the car. On heavyweight equipment, large, flat belts linked to an axle-mounted pulley usually drove generators [34, 35]. To meet the increased need for power in cars of the lightweight era, geared shafts connected directly to an axle in addition to the belts drove generators.



34. A Gould generator is mounted on the end sill of a fabricated steel truck frame from the early 1900s.



35. The deeply dropped end sill on this 1920s-era PRR six-wheel truck provided sufficient room for the flat axle belt to drive a body-mounted generator.



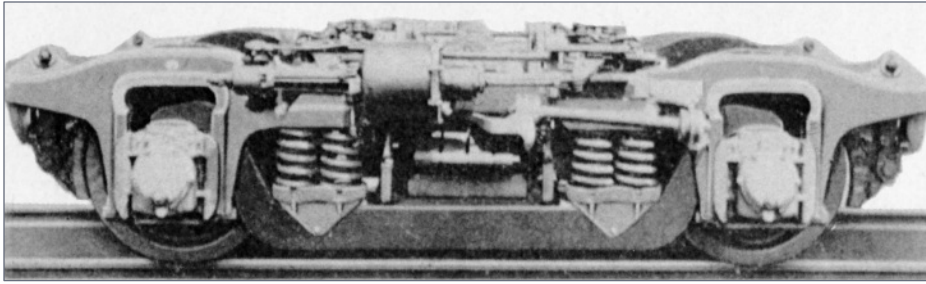
SPRINGS AND SHOCK ABSORBERS

Since the 1870s, passenger truck designers have tinkered with an endless combination of elliptical and helical or coil springs. Elliptical spring packs are made up of a variety of lengths and leaves. As the leaves flex against one another they tend to be self-dampening.

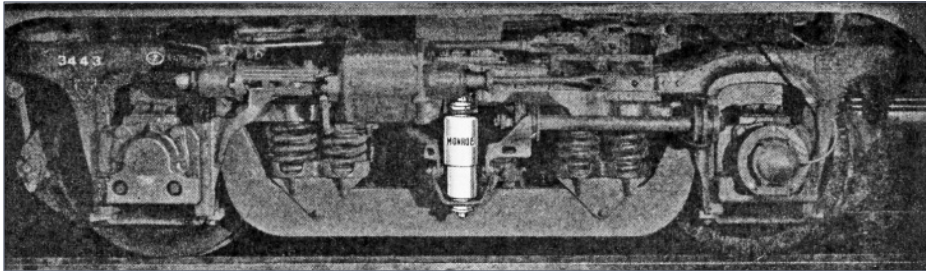
Coil or helical springs provide a softer ride, but they can be bouncy and develop harmonic vibrations. To help mitigate the bounce, coil springs are generally fitted with a damping device, or a second inner coil wound in the opposite direction.

All-coil trucks required shock absorbers to dampen runaway bouncing. The two most common types were adapted from the automotive industry. Monroe tubular hydraulic shock absorbers modified for use on railroads were introduced in 1938 [37].

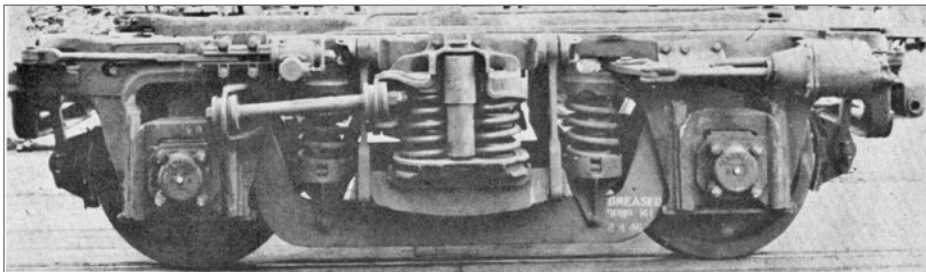




36. This Commonwealth four-wheel truck has four-section elliptic bolster springs and dual coil equalizer springs. This popular truck was original equipment on cars Pullman built in the late 1930s for the Baltimore & Ohio, Rock Island, New York Central, and Illinois Central railroads.



37. Promotional literature from the 1940s highlights a Monroe hydraulic shock absorber.

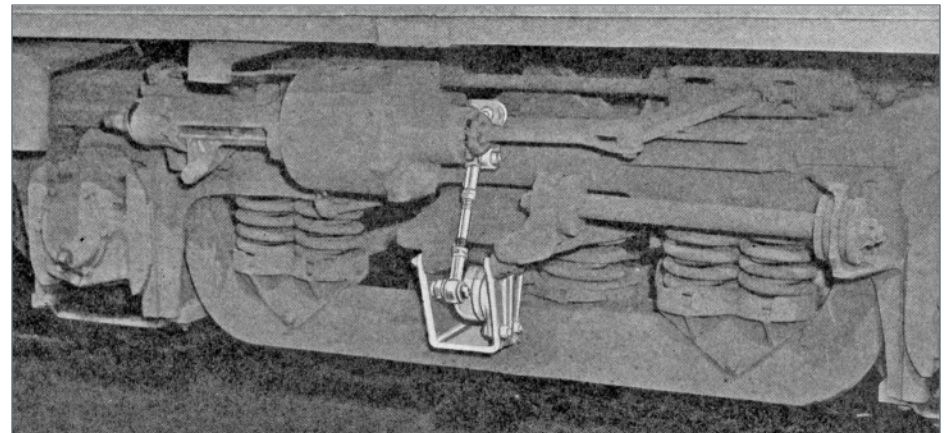


38. The New York, New Haven & Hartford Railroad ordered this all-coil spring truck from GSCC in the 1940s. Note the outside swing hanger for the bolster springs, the bolster anchor, and the Monroe automotive-style shock absorber.

Within a few years Houdaille rotary friction snubbers were also installed on railroad trucks [39]. Manufactured by the Houdaille-Hershey Corp. of Buffalo, NY, they had the advantage of being adjustable without removing them from the truck. (Houdaille is pronounced who-DIE-uh).

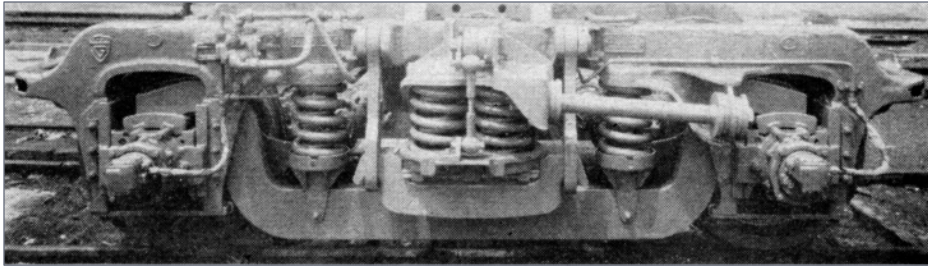


39. Close-up of a Houdaille rotary friction snubber.

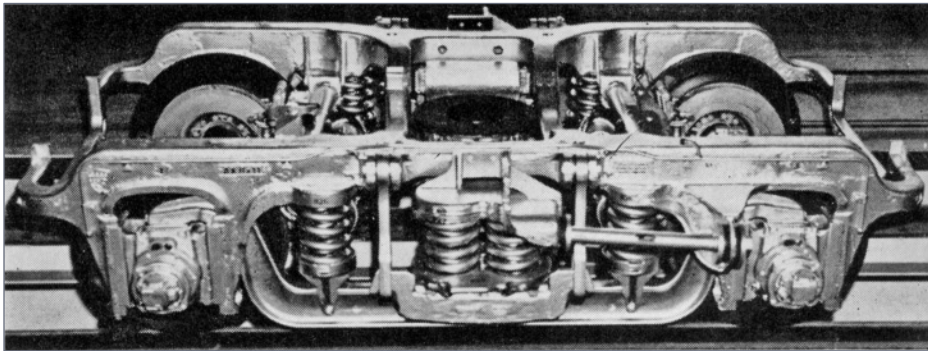


40. Sales literature from the mid-1940s highlights a Houdaille rotary friction snubber on an all-coil truck.





41. The Union Pacific specified this class 41-CUDO-11 all-coil spring truck for 118 sleepers it ordered from Pullman, Budd, and AC&F between 1949 and 1956, and 221 more it rebuilt in the early 1960s. Spotting features on the truck include an outside bolster swing hanger, a bolster anchor, Decelostat anti-wheel-slide system on the axle caps, and a Houdaille friction snubber visible between the bolster springs.

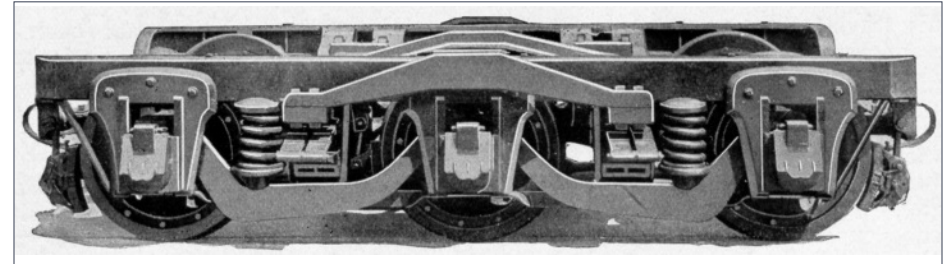


42. Identifiable components on this all-coil spring truck, cataloged by GSCC in the late 1960s, include a bolster anchor, outside swing bolster and an I-beam inside drop equalizer.

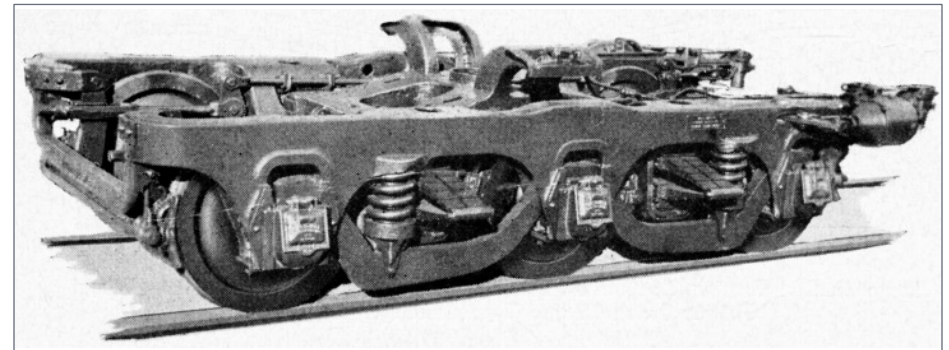
CAR SIDE-BEARINGS

Heavy car bodies supported on a small bolster plate at the center pin of a truck, can lean excessively, especially around curves. Side-bearings were developed to reduce rolling and provide a more stable footing for the car body.

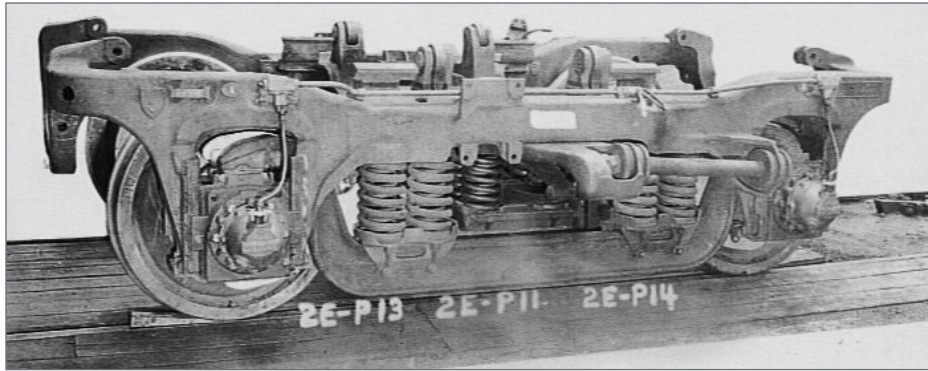
A greased pad on the underside of the car body rested on a static support at the edge of the truck [43]. The two surfaces slid against one another as the car rounded curves. In some applications a fixture with heavy rollers was mounted on the truck frame [45].



43. This GSCC six-wheel truck from the late 1920s has car side-bearings mounted on the outside of the truck frame above the elliptical springs. This common truck of the heavyweight period has bolted-on pedestals, plain-bearing journals, dogleg drop equalizers and coil equalizer springs.



44. This Commonwealth six-wheel truck from the heavyweight period has gooseneck car side bearings. Due to clearance issues, some air brake cylinders were mounted on the end sill rather than on the side of the truck.



45. The car side-bearings on this all-coil Pennsylvania class 2E-P11, P13, P14 truck are lateral rolling wheels. The anti-wheel-slip controllers are in place on the journal cap, but the brakes and linkage are yet to be installed.

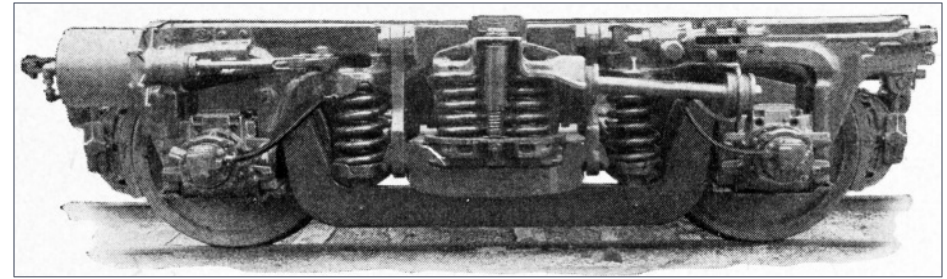


SWING BOLSTER

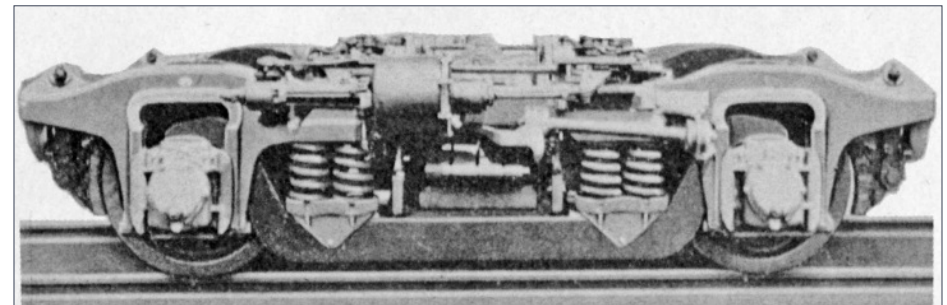
Trucks have vertical flexibility, but no lateral flexibility to absorb shock from the wheels. The development of the swing bolster, patented by Charles Davenport in 1841, was a significant advance in truck design.

In a conventional design, the bolster is connected directly to the truck frame. In Davenport's design, the bolster is connected to the wheel pieces with swing links connected to a secondary bolster, called the spring plank. This allowed the bolster to move laterally as much as one inch, which greatly reduced the transfer of any shock from the wheels to the car.

The swing links are readily visible in [46] and [48]. Davenport's swing bolster was not immediately accepted. In fact, some mechanical engineers argued that the laterally moving bolster made the ride worse.



46. This Commonwealth truck from GSCC is like those used on the *Train of Tomorrow* Pullman built for General Motors in 1946. Details visible on this side of the all-coil truck include bolster springs resting on a spring plank suspended by an outside swing hanger, a bolster anchor, Decelostat anti-wheel-slip controllers, a hydraulic shock absorber, and an air brake cylinder mounted at the end of the truck frame.



47. The inside swing hanger on this four-wheel truck is less visible than the outside type of swing hanger in [48].

SWING HANGER

Swing hangers are links that suspend the spring plank and bolster spring from the truck frame, allowing them to move laterally, thus minimizing the transfer of shock to the car body from abrupt sideways movement of the wheels.

There are two types of swing hanger: inside [47] and outside [48], with the former being difficult to see, especially on a

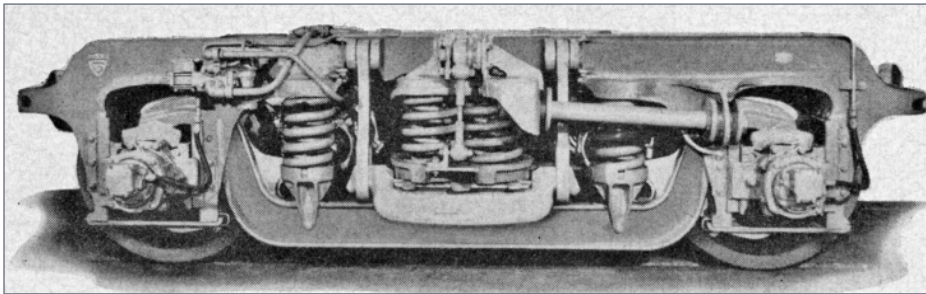
model. Inside swing hangers had been in use for decades, but outside swing hangers first appeared in 1946 on the General Motors *Train of Tomorrow* [46]. For unknown reason, the design was not commonly applied until the early 1950s.

Outside swing hangers allow for a longer truck bolster that extends beyond the side frame, which improves stability and reduces body roll. Outside swing hangers also allow the use of softer bolster springs, which further improves ride quality.

Beginning in the 1950s, most new passenger cars were given trucks with outside swing hangers. They essentially solved the problem of excessive side roll on heavy dome cars and diners.

THE LIGHTWEIGHT ERA

Despite the financial limitations of the Great Depression, the American railroad industry managed to reinvent itself during the 1930s. With the promise of modernization by the fledgling diesel locomotive, passenger car builders utilized the perfection of spot welding and modern materials, including aluminum and stainless steel, in the development of lightweight passenger cars.



48. The outside swing hangers are readily identified on this class 41-CDO-11 four-wheel truck. The Santa Fe ordered this truck on more than 50 lightweight sleepers Pullman built in the late 1930s and early 1940s. The ATSF also ordered this truck on 55 cars from Budd and ACF during the post-war years.

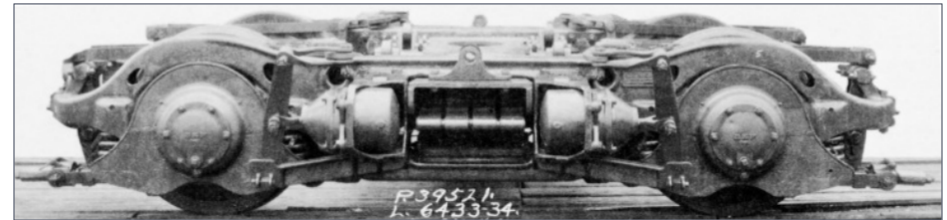
Lightweight cars required a new type of truck, the focus was on four-wheel trucks for faster, lighter passenger trains. Except for articulated cars and some heavy diners and dome cars, six-wheel trucks were seldom used on new lightweight passenger cars.

Other than the introduction of bolster anchors and the extensive use of outside swing hangers, the design of four-wheel passenger trucks during the lightweight period was active but hardly revolutionary. There was an abundance of new designs, but the fundamental difference from one lightweight truck to the next was a matter of size, shape, and arrangement of the basic components.

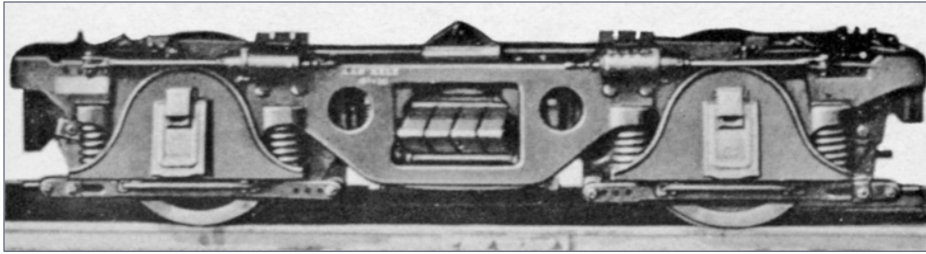
The triple-bolster truck was an exception. It was an expensive and complicated attempt to eliminate the need for heavy equalizers. The Pullman Company's version of a triple-bolster truck had wing-like pedestals that looked like Napoleon's hat [50].

Coil springs were located at each end of the pedestal. The heavy equalizer and its sizable chunk of unsprung weight were eliminated.

The design offered a soft ride, but the trucks tended to get out of tram and weave or hunt. The addition of bolsters in 1941 corrected the problem. Triple-bolster trucks did not gain wide acceptance.



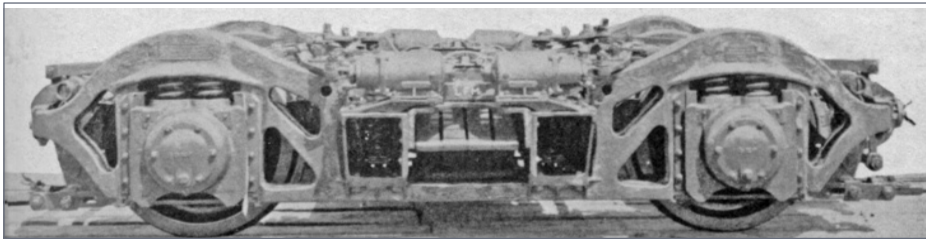
49. The Locomotive Finished Material Co. produced this triple-bolster truck in 1936 for the Illinois Central's Pullman-built *Green Diamond*. Coil springs were positioned at each end of the wing-like pedestals. Also unusual are the individual brake cylinders for each wheel.



50. This triple bolster truck with wing-type pedestals was used on 24 *Daylight* cars Pullman built for the Southern Pacific Railway in 1937. The trucks were modified in the early 1940s with the addition of bolster anchors and roller-bearings.



51. GSCC built this distinctive lightweight six-wheel coach truck in the late 1940s for the Canadian National Railway.



52. The Locomotive Finished Material Co. developed this distinctive triple-bolster truck for the Union Pacific's lightweight *Challenger* cars. Note the pair of coil springs above the journal box, and the hardened steel liners riveted to the pedestal.



R. Bale

BOLSTER ANCHOR

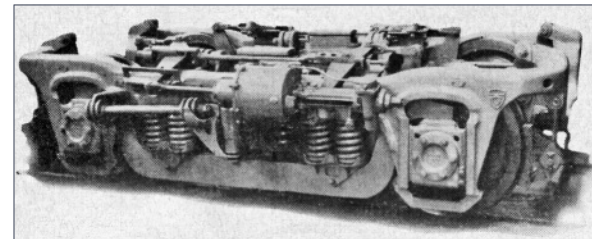
GSCC introduced the bolster anchor in the very late 1930s. Also known as a floating bolster, horizontal stabilizer, or drag link; the bolster anchor consists of a heavy rod that ties the truck frame to the bolster.

The anchor permits the bolster to move vertically, while keeping it square with the side frame of the truck. Substantial rubber mounts on each end of the rod minimize shock and vibration.

The device all but eliminated the problem of hammering and excessive wear between the bolster and the transom. Following its introduction, the bolster anchor became a virtual standard on four-wheel trucks of the lightweight period.

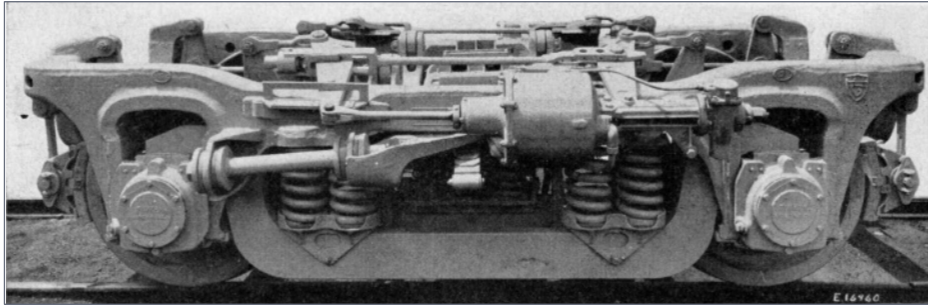


53. GSCC bolster anchor.

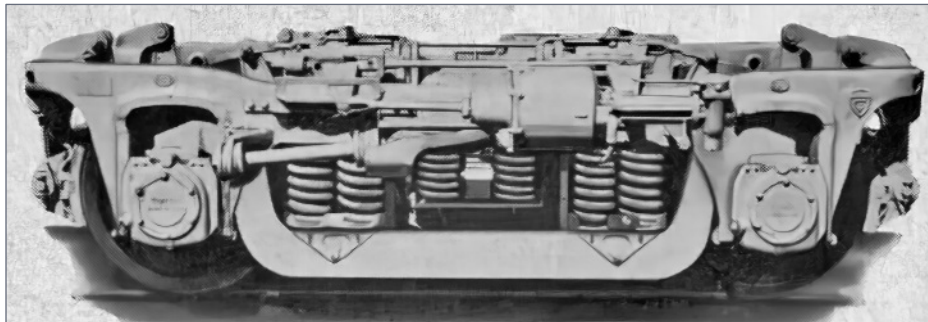


54. GSCC cataloged the Commonwealth four-wheel all-coil spring passenger truck from 1946 thru the early 1950s. It featured drop equalizers, paired equalizer springs, bolster anchors, and Monroe shock absorbers.

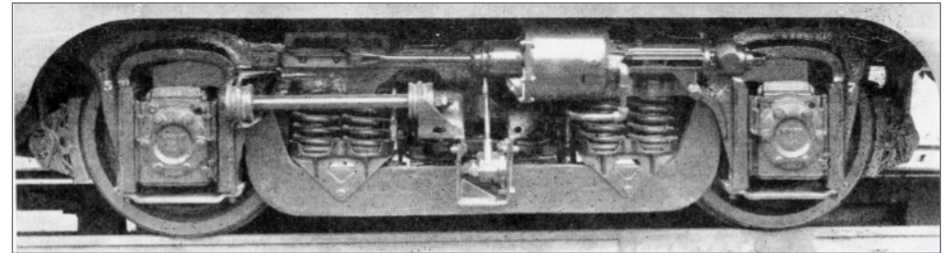




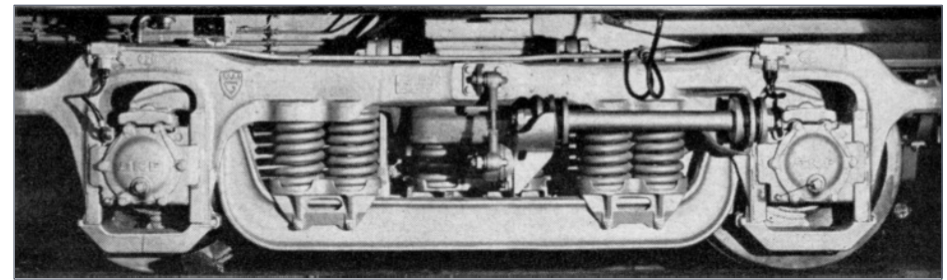
55. Pennsylvania Railroad class 2E-P6 four-wheel passenger truck in use in the late 1940s had inside swing hangers, a bolster anchor, and coil equalizer springs. A sizable air brake cylinder is mounted outside the truck frame.



56. This popular Commonwealth lightweight, four-wheel passenger truck has bolster anchors and paired coil equalizer springs. The bolster spring package is a combination of coil and a single section of elliptic springs. Pullman used slight variations of this GSCC truck from 1948-1951.

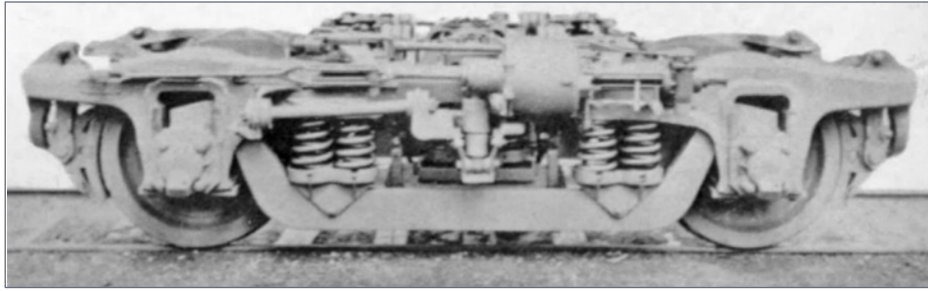


57. GSCC introduced this Commonwealth four-wheel passenger truck after WWII and cataloged it through the 1950s. Spotting features include a bolster anchor, Houdaille rotary friction snubber, drop-equalizer with paired coil springs, Timken roller-bearings, and outside-mounted air brake cylinder. This popular truck was used on cars built by Pullman, AC&F and Budd. Railroads specifying this truck included the Wabash, Texas & Pacific and Missouri Pacific.

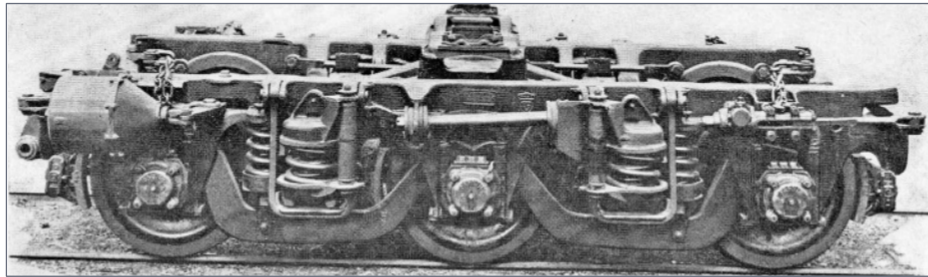


58. During the early 1950s, GSCC supplied this four-wheel single-bolster truck to Pullman for lightweight sleepers built for the Baltimore & Ohio in 1948 and Great Northern and Northern Pacific in 1950. It features an anchor bolster, Houdaille rotary friction snubber, and an equalizer forged with a weight-saving I-beam cross section.





59. This lightweight Commonwealth four-wheel truck is from the early 1940s. Note the slender bolster anchor, Monroe shock absorber and air brake cylinder mounted outside the one-piece cast frame.



60. This all-coil six-wheel Commonwealth truck from the post-war period has bolster anchors, outside swing hangers and a total of four Monroe shock absorbers.

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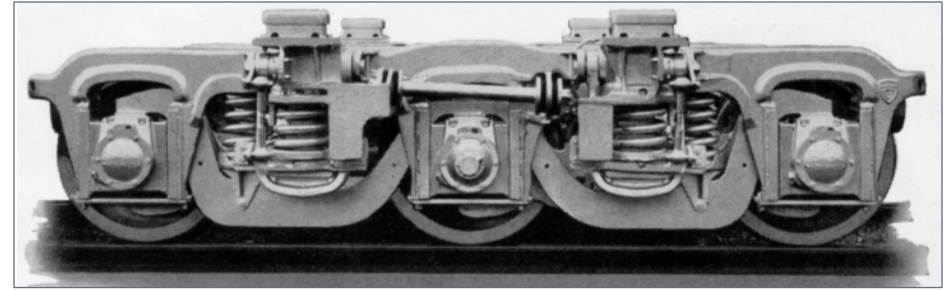
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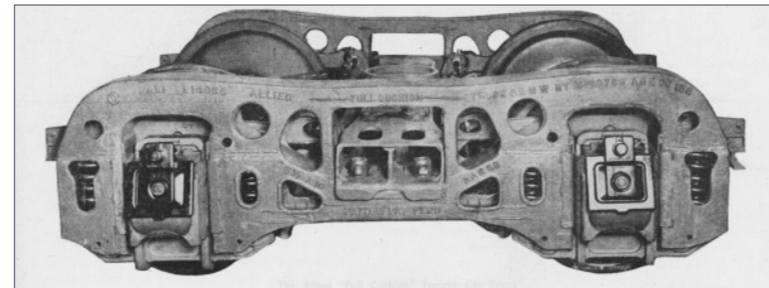
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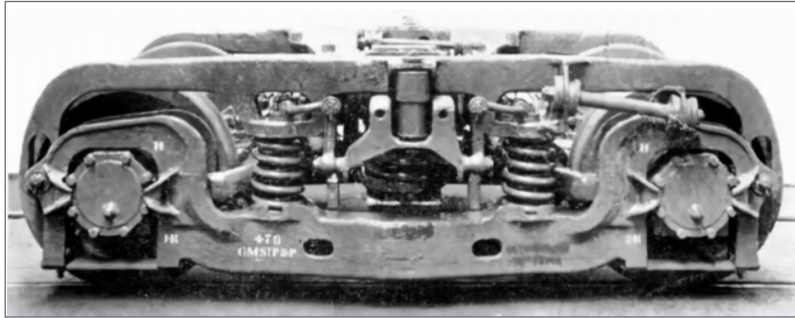


61. Among the few six-wheel trucks developed during the lightweight era was this all-coil truck GSCC introduced in the mid-1950s. Note the bolster anchor, outside swing hangers, dual Houdaille rotary shock absorbers, and four car side-bearings. Budd used this truck on 14 full-length dome cars the Santa Fe ordered in 1954, and on six Missouri Pacific 10-6 sleepers built in 1956.

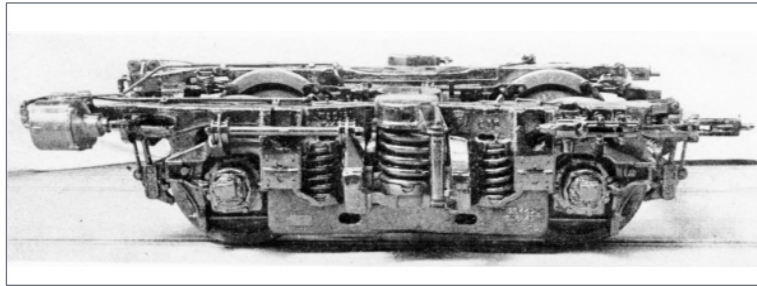
UNIQUE TRUCKS



62. The unique Allied Full Cushion truck was used in high-speed service, including express cars and troop sleepers, from WWII to the mid-1950s. The Allied truck provided a soft ride; The Southern Pacific even used them briefly on ammunition boxcars. Unfortunately, the Allied truck was prone to derail at high speed. As with other trucks where the journal boxes moved vertically inside frame pedestals, the boxes tended to bind, causing the truck frame to get out of tram. A second negative was that Allied trucks were difficult to service. The controversial truck was banned from interchange service in 1955.



63. The Milwaukee Road used this unusual Commonwealth all-coil truck in the 1960s for some of its lightweight coaches. The distinctive truck frame is matched to an equally unusual outside cast drop equalizer.



64. Another distinctive Milwaukee Road truck is this 1950s-era four-wheel passenger truck with an in-line row of coil bolster springs, shock absorbers, leveling bars, and slender bolster anchors.

BIBLIOGRAPHY

Car Builders Cyclopedia, 1919, 1931, 1940, 1946, 1953 editions.

Car & Locomotive Builders Cyclopedia, 1970, 1984 editions.

Cast Steel Passenger Truck, The Railroad Gazette, June 1904.

How to Classify and Identify Trucks Under Passenger Service, John M. Fiscella, NMRA Clinic 2008.

Lightweight Passenger Car Trucks, Pat Wider, Railway Prototype Cyclopedia, Vol. 6.

Passenger Car Trucks –An Introduction, Martin McDonnough, 1985, Railroad Passenger Car Alliance.

Passenger Trucks, Model Railroader Magazine, May 1956.

Passenger Trucks of the Lightweight Era, Parts I & II, W. Gordon Anderson, Mainline Modeler Magazine, January, March 1982.

Railroad Car Builders Dictionary, Matthias N. Forney, 1879 Edition.

The American Railroad Passenger Car, Vol. 2, John H. White Jr., John Hopkins University Press, 1978.

Union Pacific Passenger Car Trucks, UtahRail.net.

PHOTO CREDITS

American Car & Foundry archives, Fig 5; Author's collection, Figs 13, 17;

The American Railroad Passenger Car, Figs 2, 3, 12, 32, 49; General Steel Casting Corp promotional material, Fig 14, 20, 21, 24, 33, 43; Locomotive Finished Material Co., promotional material, Fig 49;

Pennsylvania Railroad service manual, Figs 6, 7, 15, 18, 19, 45; Pullman-Standard Archives, Fig 11;

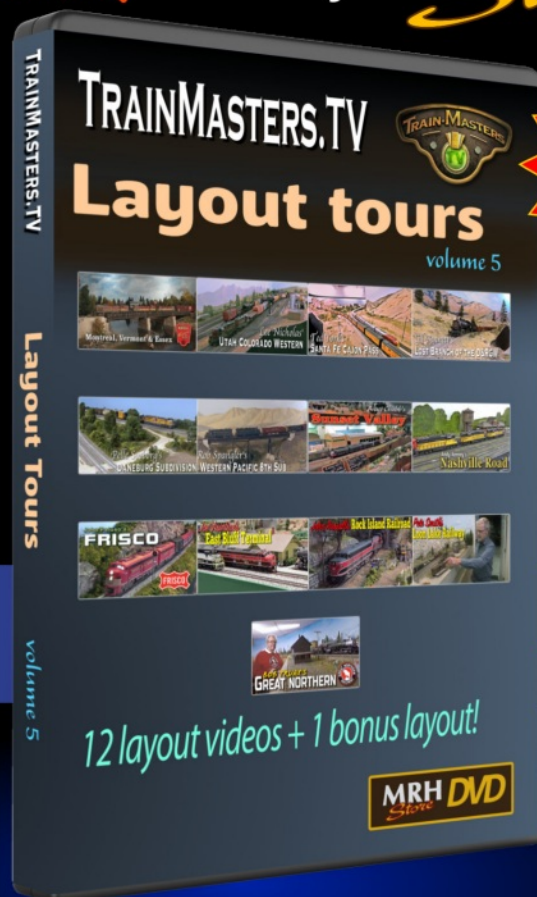
Union Pacific Museum, Fig 41; Pat Wider, Fig 61; Car Builders Cyclopedia, all others. ☑



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Going modern on the New Jersey Division Part 2



1. A NS stack train passes by CP Potter in Edison, NJ. This train features UP run-through power.



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M.R. SNELL TAKES US ON A TOUR OF THE LEHIGH LINE PORTION OF HIS RAILROAD ...

THE LEHIGH LINE IS THE FORMER LEHIGH VALLEY RAILROAD MAINLINE between eastern Pennsylvania and northern New Jersey. This became the main Conrail route into north/central Jersey from the west, with Delaware & Hudson trackage rights adding a few intermodal trains each week. Now it's the mainline for both NS & CSX with Canadian Pacific retaining D&H's trackage rights.

The iron begins in Newark at NK Tower and runs west under Conrail Shared Assets control until CP's Port Reading Junction at

milepost 35.8 in Manville, where the line splits. NS then takes control of the Lehigh Line. Both NS & CP trains continue west to Allentown, while CSX trains use the Trenton Line for their run to Philadelphia.

A closer look at the signals at NK Tower reveals the still-standing remnants of an old Lehigh Valley signal bridge. Railroads frequently mounted signals on iron bridges that spanned the tracks. When these bridges were too low for the clearance requirements of double-stack container trains, the railroad replaced them with signal masts [4, 5].

Several miles west of NK, CP Townley is where the North Jersey Dispatcher takes control of westbound trains, while eastbound trains enter the territory of NK Tower enroute to Oak Island or points beyond.



2. This view from the Oak Island yard office shows NK tower in the distance. The large building beyond the tower conceals a cut through a wall that enables the Lehigh Line to travel west.



3. CSX613 creeps to a stop beside NK tower. The round plate on the signal carries the letter R, indicating the signal can be treated as Restricting rather than

Stop and Proceed. Another variation is G for Grade, which also enables a train to continue without stopping.



4. A prototype installation along the Lehigh line. The remains of the former signal bridge, including the electrical junction cabinet (right) still stand, but the signals are now mast-mounted (left).





5. Including bits from the past helps add a sense of history while also creating interesting vignettes. This cut-off signal bridge was patterned after the prototype in [4].

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6, 7. This area formerly housed a coal-fired power plant, a “traditional” model railroad industry. The space has been modernized with the Essex Resource Recovery Center, which handles modern waste-removal-container traffic. Only the buildings have been swapped out; the tracks remain the same.



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8. Many of us have ties with fallen flag roads that can be easily represented with equipment “donated and preserved” by local historical groups. All it requires is a short segment of weedy unused track.



9. SD70M-2 2654 leads an eastbound manifest train 18G through track 1 of the interlocking. 2654 represents the next generation of microprocessor-controlled locomotives taking over the modern rail scene.



10. Westbound CSX train Q268 has UP power leading, starting the long journey back to its home rails.



11. Municipal solid waste is a new unit-train commodity that has developed in the last 15 years. Easily identifiable by the tall, oversized containers, MSW trains can be found wherever local landfills can no longer handle the local waste.



Irvington Industrial Track splits from the Lehigh Line near a large industrial plant east of the interlocking then rejoins the line at Roselle Park. On the embankment behind the plant is NJ Transit's Raritan Line, which parallels the Lehigh Line out to Plainfield where it crosses over the Lehigh Line to continue to Raritan.



12. Here we see NS 2939 working on the Irvington Industrial Track, sandwiched between the Lehigh Line in the foreground and the NJ Transit Raritan Line on the embankment behind the engine.

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13. OI-67 prepares to make the final shove back onto the Irvington Industrial Track at Roselle Park. The GP38-3 in charge is a former Southern GP50 that once powered crack hotshots, now downgraded and rebuilt for local service.



14. An overhead bridge can be both photogenic and practical. Here we see CSX Q190 emerges under the NJ Transit Raritan Line whose large bridge creates a view divider between scenes on the layout.



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15. OI-10 drifts to a stop under the Garden State Parkway. Today's power includes an ex-Conrail GP38 with yellow-painted pilots for enhanced visibility from when it was assigned to the Bayway Refinery in the 1990s.

The Rahway Valley is a shortline road that junctions with the Lehigh Line at Cranford. Operated by the Morristown & Erie, the Rahway Valley serves two customers: a lumberyard and a chemical plant.

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16. An Alco C424 powers this local freight on the Rahway Valley. Even though the American Locomotive Company has been gone for more than 40 years, the locomotives live on, popular with shortline operators due to their low cost and continued parts availability.



17. Jaeger Lumber provides us with a look at the past, when towns had local lumberyards that received shipments by rail. Few of these remain, having been supplanted by big-box stores served by truck.



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18. CSX train Q301 passes through Cranford. The lone covered hopper at right is on the Rahway Valley interchange tracks. Interchange between roads incorporates operations into a layout and requires little space.



19. One facet of prototype modeling is the ability to learn about and recreate road-specific models, such as the high-hood locomotives NS predecessors Norfolk & Western and Southern Railway favored.



20. A hi-rail inspection truck drives along the rails at Cranford as eastbound auto rack 18N rushes past at track speed. Once the domain of speeder cars, track inspection is now performed in special trucks equipped with hi-rail wheels that enable them to operate on both rail and road.

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M.R. Snell

DISPATCH FORM D

Dispatch Form D is the NORAC equivalent to a track warrant. It is an all-encompassing document that covers almost any situation that could be accompanied on the railroad. Crews radio their trains' positions in to dispatch and use Form D to record any instructions.

For example, in the case of the hi-rail inspection truck in [20] hi-rail operator Foreman Gruber would radio his location to Dispatch. He would then record the following instructions as given, reading each line back to the dispatcher to confirm copy:

"Form D Number C102...today's date, March 10, 2012...to Foreman Gruber, TC A5188 at Cranford... Circle Line 2...Operate in west direction on single track between Cranford & Oak Tree Circle line three...Trains or track cars ahead...none...TC proceed past Stop Signal at Cranford & CP Potter...Dispatcher DLS." [21]

CT 401 REV 1-83 NORAC
Movement permit form D

FORM D No. C102 FORM D NO(S) DATE March / 10 / 2012
DELIVERED TO
TO Foreman Gruber, TC A5188 at Cranford

LINE	TRK(S)	BETWEEN/AT	SPEED PSGR / FRT	SPEED SIGNS DISPLAYED YES NO

1. TEMPORARY SPEED RESTRICTIONS

2. OPERATE IN west DIRECTION(S) ON single track TRK BETWEEN Cranford AND Oak Tree Circle
ON TRK BETWEEN AND DSPLR TIME
ON TRK BETWEEN AND DSPLR TIME
ON TRK BETWEEN AND DSPLR TIME

3. TRAINS OR TRACK CARS AHEAD None Cranford & CP Potter
TC PROCEED PAST STOP SIGNAL(S) AT

4. TRK OUT OF SERVICE BETWEEN/AT
IN CHARGE OF
IN CHARGE OF TRK OUT OF SERVICE BETWEEN/AT

5. LINE TRK OBSTRUCTED FOR MAINTENANCE BETWEEN
AND

6. NON-SIGNALLED DCS RULES IN EFFECT ON TRK(S) BETWEEN AND

7. INT AND CP SIGNALS OUT OF SERVICE ON TRK(S) AT

8. REMAIN AT ON TRK UNTIL ENGINE ARRIVES TO ASSIST

9. OPERATE AT RESTRICTED SPEED ON TRK TO WHERE TRAIN IS DISABLED

10. TBS IN SERVICE AT

11. CBS RULES OUT OF SERVICE ON TRK(S) BETWEEN AND

12. PROTECT CROSSING(S)

13. OTHER INSTRUCTIONS/INFORMATION

DISPATCHER DLS DATE / / DISPATCHER TIME EFFECTIVE
FORM D CANCELLED, TIME DATE / / DISPATCHER

21. Once the Form D is dictated by the Dispatcher it must be read back by the party receiving it.

Once it is read back correctly it is given a TIME EFFECTIVE (lower right corner) by the Dispatcher, officially putting it into effect.

CP Potter in Edison has been featured in tons of railfan pictures, and even in a professional video about Conrail hotspots in the 1990s. The rails here are single track with a controlled siding. Longer than passing sidings, controlled sidings are long enough that the dispatcher can use them to make meets, making them function like double track.



22. In developing a layout, we often must include curves in unrealistic locations. Bridges are an excellent way to conceal them. This overpass in suburban Edison conceals a looping curve that exits under the bridge to the left.

in the **DECEMBER 2021 MRH RUNNING EXTRA!**

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MRH RUNNING EXTRA





23. Ex-Conrail NS SD60M 6795 still proudly displays its former railroad's livery as it leads NS manifest 36G west past CP Potter.



24. Ex-LMS C40-8W 8459 leads NS manifest 64J eastbound. LMS – Locomotive Management Services – was a partnership between Conrail and GE in which locomotives spent half the year in Conrail service and the rest on lease to other roads.

This stretch of the Lehigh Line between Newark's NK Tower and CP Potter offers modern heavy freight action, with a time warp of museums and shortline power along the way. Next month, we begin from the west end of the Lehigh Line at Manville, proceeding eastward to CP Potter in Edison.. ☑

M.R. SNELL



M.R. (Matt) Snell has been a model rail-roader and railfan for 30 years. His interest in railroading grew while growing up in New Jersey surrounded by freight and passenger rail lines.

Presently residing in Ohio, Matt and his wife Debie share the hobby, modeling the area he grew up in: north-central New Jersey.

Their "Conrail New Jersey Division" layout has been featured in *Great Model Railroads*, *Rail Model Journal*, and in the Allen Keller *Great Model Railroads* DVD series. Matt has had articles in *Railroad Model Craftsman*, *RailModel Journal*, *Scale Rails*, and *Model Rail-roader*, as well as online at railroad.net. ■

in the **DECEMBER 2021 MRH RUNNING EXTRA!**

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Model Railroad Hobbyist | December 2022



Weathering a Walthers 14K sulfur tank car

YouTuber **DansRailroad2011** weathers a tank car step-by-step in this 30 minute video. Dan shows the entire weathering process up close with some great camera work. It's a nicely done how-to that's well worth the time to watch.

Weathering dark cars like tank cars can be challenging, so it's important to find good examples on YouTube to build your confidence with weathering dark rolling stock. ☒



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DECEMBER NEWS

column



Model Railroad Hobbyist | December 2022

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



INDUSTRY NEWS

Steve Stewart 1943-2022



Steven John Stewart, founder of Stewart Hobbies Inc. in 1984, died November 29, 2022, following a long-time battle with Parkinson's disease. With close support from his late wife, Theresa, Stewart produced and successfully marketed a well-founded line of HO scale locomotives and freight cars.

Stewart Hobbies was launched in Stewart's home basement in 1984 and flourished for 20 years until he retired and sold the business to Bowser Manufacturing. He continued his railroad interests through involvement with the Anthracite Railroads Historical Society. Before entering the hobby business, Stewart taught American history in the public school system for almost 30 years. He also served as a baseball and football coach, ran the student council, and led several other school support functions.

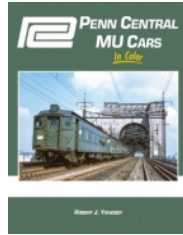
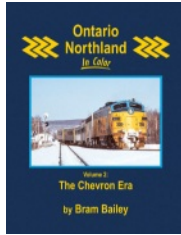
THE LATEST MODEL RAILROAD PRODUCTS, NEWS & EVENTS

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NEW PRODUCTS FOR ALL SCALES



New titles released this month by **Morning Sun** include *Ontario Northland in Color Volume 2*. Author Bram Bailey documents the active subdivisions as well as locomotives and cabooses of Ontario Northern's "Chevron Era"

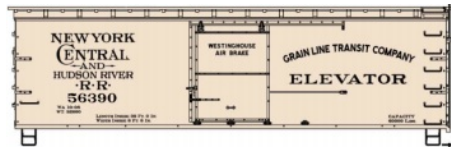
that began in 1974.

Prior to the formation of Penn Central, the three predecessors - PRR, NYC, and NYNH&H - had the three largest MU fleets in the country. In *Penn Central MU Cars in Color*, Robert Yancey presents the most far-ranging roster of MU cars ever assembled.

Softcover color portfolios just released by Morning Sun include *Railfanning in the 1960s - Best of Ed Johnson*, and *Chesapeake & Ohio in Color*.

Info: morningsunbooks.com

HO SCALE PRODUCT NEWS



double-sheathed wood boxcar in a special 3-car set.



This twin-bay Center-Flow covered hopper car is based on a 2970 cu. ft. prototype ACF built for the Rock Island Railroad in 1970.

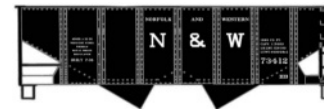


The Pennsylvania Railroad added this 40' single-sheathed boxcar to its roster in 1913.

The class X23 wood car features Dreadnaught ends and Youngstown sliding steel doors.



This HO scale Cargill ACF twin-bay aluminum covered hopper is available from Accurail in a special 3-car set.



Although built in 1934, Norfolk & Western patterned this twin-bay coal hopper after the proven USRA 55-ton design from 1918. Accurail has

released a 3-car set of HO scale kits for this car.



The Southern Pacific used specially decorated 41' single-sheathed boxcars to introduce its Overnight freight service

in 1935. Accurail's HO scale kit for the SP cars has Dreadnaught ends and Youngstown steel doors.



Completing Accurail's latest release is an HO scale kit for this 40' Chicago & North Western single-sheathed

wood boxcar that went into service in 1924. All Accurail HO scale car kits come with appropriate trucks with Delrin wheelsets and Accumate knuckle couplers.

Info: www.accurail.com

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RUNNING EXTRA





R. Bale

EMD SD45T-2 LOCOMOTIVE

The SD45T-2 is a six-axle, 3,600 hp diesel locomotive built by EMD between 1972 and 1975. Nicknamed Tunnel Motors, the "T" version differs from the basic SD45-2 in that it has the rear air intake lowered to the walkway at the rear of the locomotive. This helped provide cooler air into the locomotive's radiator system reducing the tendency of the 20-cylinder 645E3 prime mover to overheat in tunnels.



Athearn is working on a new release of an EMD SD45T-2 diesel locomotive. The HO scale model is at the top of Athearn's January 2024 production schedule. Except as noted, most road names will have the headlight mounted in the nose, modified L window cab, an A/C unit on the roof and HTC high-traction C-C trucks. The Union Pacific locomotive shown above will have ditch lights mounted on the pilot.



Southern Pacific units will be available decorated with Speed Lettering as well as in Railroad Roman.

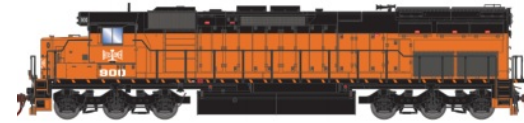


A Cotton Belt unit in faded paint and both of the SP versions will have a front anticlimber and a large front plow.



Athearn's SD45T-2 decorated for Canadian National will have a small anticlimber and ditch lights

mounted on the front walkway. This release will include ex-BNSF units patched for Kansas City Southern.



A Bessemer & Lake Erie locomotive will have a Dash-2 cab with standard windows, ditch lights

mounted on the pilot, and a Gyrallight above the cab-mounted headlight. Additional features on all models include see-through radiator grilles and dynamic brake fans, wire grab irons, rubber trainline and MU hoses with silver ends. An undecorated SD45T-2 will be available with SP details.



R. Bale

EMD SW1500 DIESEL LOCOMOTIVE

The SW1500 is a 1,500hp diesel electric locomotive built by General Motors Electro Motive Division from 1966 to 1974. EMD's SW series of locomotives share the same body design introduced on the SW7 in 1949.

Dual stacks distinguish the SW1500 from its SW1200 predecessor, which had only one stack. The SW1500 is further distinguished from earlier SW locomotives by its four-window cab. EMD delivered the SW1500 with Flexicoil B-B trucks. The SW series, including the SW1500, was designed primarily for industrial yard switching but they were frequently assigned to light road switching service.



Athearn's January 2024 production schedule includes an HO scale EMD SW1500 switch engine with numerous road specific details.



Models decorated for Rock Island, Southern Pacific and Union Pacific will have large fuel tanks and front footboards.



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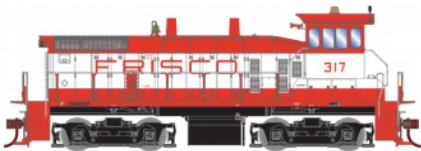
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Models decorated for Norfolk Southern, Chehalis Western, and Electro-Motive will have mid-size fuel tanks.



Milwaukee Road models will have all-weather cab windows, dynamic brakes and a 1,700-gallon fuel tank.



Completing the January 2024 run of SW1500 switch engines is a Frisco unit with AAR type A trucks. All other road names in this release have EMD Flexicoil B-B trucks. Additional features

on the Frisco locomotive include footboards on the front and rear, and a Stratolight beacon on the cab roof.



All versions of the SW1500 switcher feature wire grab irons, front and rear trainline hoses with silver glad hands,

MU stands, operating ground lights, and a see-through radiator intake grille. Athearn's SD45T-2 and SW1500 will both be available as DCC models with a DCC decoder with SoundTraxx Econami sound. DC models will be DCC-ready with a 21-pin NEM plug.

Athearn's January 2024 production scheduled includes several versions of this Genesis ACF 4600 cu. ft. triple-bay covered hopper. Three body styles will be available: Early production (high side ladder and brake wheel, single side stiffener), Mid production (low brake wheel, short side ladders, single side stiffener), and Late production-post 1971 (low brake wheel, short side ladders, double side stiffeners).

Road names on this release will be Soo Line, Akron, Canton & Youngstown; Vermont Railway, Santa Fe, Union Pacific, and Western Pacific

Details on all versions include photo-etched roofwalks, wire grab irons and stirrup steps, separate brake cylinder, valve and air reservoir with wire brake plumbing, round or trough hatches, and Genesis 100-ton trucks with 36" machined metal wheels and rotating roller bearing caps.



This injection molded 40' quadruple-bay hopper car with offset sides is coming from Athearn in January 2024.

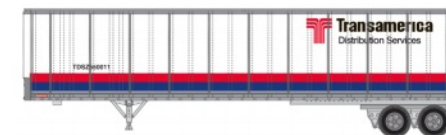
Road names will be Western Maryland, Missouri Pacific, Peabody, Denver & Rio Grande Western, Lehigh Valley, and Chesapeake & Ohio. The model will be equipped with 50-ton Bettendorf-type plain-bearing or 70-ton roller-bearing trucks as appropriate to the prototype being modeled.



Athearn plans to release a Genesis Series F89-F TOFC flatcar with

a 45' Fruehauf Z-Van trailer. The sets include a Kansas City Southern flatcar with a KCS trailer, a Southern Pacific flatcar with SP trailer, a brown Trailer Train flatcar with a Clipper trailer, and a yellow Trailer Train flatcar with a BN trailer.

Features on the Genesis model include a heavy diecast underframe, wire brake plumbing, wire grab irons, and 70-ton roller-bearing trucks with machined metal wheels and rotating bearing caps. Both raised and lowered hitches are included with each model. A minimum track radius of 22" is recommended for reliable operation. All Athearn rolling stock models come with McHenry knuckle couplers.



The 45' Fruehauf Z-Van trailers have rubber tires and separately applied mud flaps. In addition to the sets listed

above, all of the flatcars and the trailers will be available individually with different numbers.



Athearn has included a group of 53' CIMC containers in its 2024 production schedule.

The models have a horizontal rib front. The stackable magnetic containers will be available decorated for STG Logistics, Schneider, Exel, COFC Logistics, and EMP. The containers will be offered in a 6-pack with different numbers.

Info: www.athearn.com



Atlas has set a first quarter 2024 date for the release of a new EMD GP40-2 diesel locomotive. The HO scale model will represent a Phase 2 version of the prototype, which were built from mid-1976 through late 1979. Features on the Atlas Master Series model include golden-white LEDs, detailed cab interior with crew, windshield wipers, metal grab irons, movable drop steps, walkway safety tread, coupler cut bars, etched metal radiator and dynamic brake fans, and MU and trainline hoses.



Road names will be Southern Pacific (Kodachrome scheme), Indiana Harbor Belt, Ontario Northland, Denver & Rio Grande Western, CSX (YN2 scheme), and Union Pacific (Ex-DRGW).



Additional motive power coming from Atlas during the first quarter of 2024 is an HO scale U30B Phase 2 road switcher GE introduced in late 1966. Locomotives with a high hood will be available decorated for Norfolk & Western and Ferrocarriles Nacionales de México.



Units with a standard, short hood will be available for Georgia Central, Chessie System, Burlington Northern, and Western Pacific. Both the GP40-2 and the U30B locomotives mentioned in this report will be available for DC operation and for DCC with a LokSound Dual-Mode decoder.



Atlas is developing a new Master Series CNCF 5000 boxcar for release during the first quarter of 2024. The all-new model features distinctive bifurcated ends.



Road names will be Ann Arbor, Atlantic & Western, Canadian Pacific (Ex-MCSA), Columbus & Greenville, Ferromex, Moscow, Camden & San Augustine, and Ferrocarriles Nacionales de México.



Atlas' first quarter 2024 schedule includes an HO scale Portec 3000 twin-bay covered hopper. The Atlas Master Series model will come with 100-ton trucks. Options include two body and roof walk variations, and two types of vibrator mounting brackets.

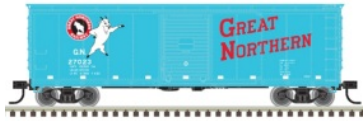


Road names will be AEX-The Andersons, Boston & Maine, MECX-Midwest Railcar, Milwaukee Road, WNFR-Winifred Railroad, and Winchester & Western.



By the beginning of WWII, most USRA double-sheathed wood boxcars had been rebuilt with steel sides. Rebuilding continued and by the late-1940s about 14,000 of the original 24,500 USRA DS cars had been rebuilt with variations in the ends and doors. Atlas has scheduled the release

of an HO scale USRA steel rebuilt boxcar in early 2024. Features of the Master Series model include wire grab irons, 10-panel sides, 7-8 or 5-5-5 ends, and operating Youngstown steel doors.



Road names will be Canton Railroad, Chicago, West Pullman, & Southern; Georgia Railroad, Great Northern, Penn Central, Santa Fe and Wellsville, Addison & Galetton.



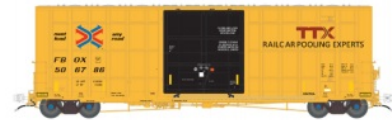
Atlas' third quarter 2023 production schedule includes a Master Series HO scale 51' 6" bulkhead flatcar.



Road names will be Algoma Central, British Columbia Railway, Canadian National, Canadian National (International service),

Winnipeg & Pacific Railway, Indiana Harbor Belt, NAPX-North American Car Leasing, and Montana Rail Link. All the Atlas HO scale freight cars mentioned in this report come with AccuMate knuckle couplers and trucks fitted with metal wheelsets.

Info: shop.atlasrr.com



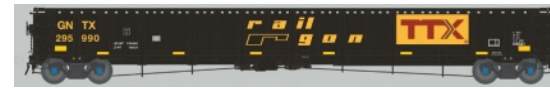
Aurora Miniatures has announced an HO scale model of the Gunderson (Greenbrier) 6276 cu. ft. 50' Plate F boxcar. The

prototype began production in 2004 and continues through present day. Many separately applied prototype-specific details will be included.



Paint schemes include AOK (Arkansas & Oklahoma RR), BKTY (Union Pacific), COER (Crab Orchard & Egyptian RR), FBOX (TTX), Illinois Central (CN), and UCRY (Utah

Central Railway). AuroraJanney scale head couplers and freight car trucks featuring bolster and center plate detail, side bearings, and brake beams will be installed. Delivery is expected in the first quarter of 2023.



3650 'Railgon' gondola. Expected in the second quarter of 2023, the model will replicate a Canadian built 66' gondola that began production in 2012.



Aurora Miniatures has also announced an HO scale model of an NSC

The model will feature separately applied brake, grab irons, cut-levers, and air hose details. Trucks will be 100-ton Barber S-2-HC trucks with metal 36" wheels with prototypical wheel contour and axle tapering. Eighteen GNTX road numbers and a data only version will be offered in the first run.

Info: na.auroraminatures.com



New HO scale craftsman kits available from **Bethlehem Car Works** include Burlington Route, a parlor/sunroom/lounge car Pullman built to Plan 3964D.



Pullman used the same plan to build three parlor/sun room/lounge cars for the Pennsylvania Railroad. The

PRR named the cars in the series State Legion, Honor Legion, and Loyal Legion. The Bethlehem kits include 3D printed car sides. The kits do not include trucks or couplers.

Info: www.bethlehemcarworks.com



ExactRail is booking advance orders for a new release of its HO scale Trinity 6275 cu. ft. plug-door boxcar. Delivery is planned for February 2023. During the mid-2010s, TTX began re-painting and applying its new "Forward Thinking" logo to its fleet.



LRS GATX began receiving an updated version of the Trinity 6275 boxcar in 2020.



The Catalyst scheme of the Southern Railway of British Columbia was applied to a fleet of 50' high-cube cars received from Trinity in 2006. While similar to the ExactRail model, the prototype version had a slightly narrower door.

In 2019, TTX repainted one of its FBOX boxcars pink to support finding a cure for breast cancer. ExactRail is offering HO scale models in both the original scheme and the subsequent repaint.



Exceptional details on ExactRail's HO scale version of the Trinity 6275 include separately applied door

tracks, etched stainless steel crossover walks, wire grab irons, steel nailable flooring, Kadee couplers, and 100-ton ASF Ride-Control trucks with 36" machined metal wheelsets.

Info: www.exactrail.com



Kadee's 2022 Christmas car is a specially decorated twin-bay open hopper. A removable lump-egg coal load is included.

The HO scale model is based on a 50-ton AAR prototype with offset sides. The ready-to-run model comes with Kadee couplers and Bettendorf-style plain bearing trucks

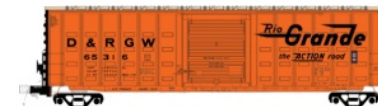
Info: www.kadee.com



Moloco is booking preorders for an HO scale ACF 50' Plate C exterior post boxcar. This production will include cars delivered by ACF in the early 1970s both with and without waffle sides.



Waffle side cars with 10' plug-doors will be available decorated for Clinchfield, L&N, and Seaboard Coast Line.



Denver & Rio Grande Western cars will have Youngstown 10' sliding doors, while Maine Central boxcars will come with 9' plug-doors. Both D&RGW and MEC cars will have waffle sides.



Cars with plain non-waffle sides will be decorated for Burlington Northern with 10' plug-doors and Rock Island with 10' sliding doors. Availability is TBA.

Info: www.molocotrains.com



ScaleTrains.com is working on a new release of its Museum Quality HO scale EMD SDL39 diesel locomotive. The model is based on a prototype built by EMD in 1969.



Features include an interior cab light, three-color classification lights, front and read ditch lights, illuminated number boards and front and rear headlights.

Road names available on this production run include two Milwaukee Road, four Wisconsin Central, and two Ferrocarriles



de Pacifica schemes. Availability is planned for August 2023. Both DC/DCC ready and DCC sound equipped models will be available.



ScaleTrain.com plans to release HO scale kits of Pullman-Standard's PS-1 boxcar next summer. The models will be based on tooling acquired from MTH in January 2021.



The injection molded plastic model will include one-piece molded trucks with 33" machined metal wheels, and plastic Kadee-compatible couplers.



Road names will include ATSF, Canadian Pacific, Chesapeake & Ohio, Chicago & North Western, Milwaukee Road, Minneapolis, Northfield &

Southern; New York Central, and Union Pacific.



R. Bale

EMD SD38-2 DIESEL LOCOMOTIVE

Built by Electro Motive Division from 1972 through 1979, the six-axle, 16-cylinder non-turbocharged SD38-2 was designed primarily for heavy, slow freight operations. Unlike the engine of its SD38 predecessor

- which drove a generator to supply power to the traction motors
- the SD38-2s 2,000hp prime mover drove an alternator which produced AC current that was rectified to DC to power the four traction motors. Another major change for the SD38-2 was the introduction of the Dash-2 modular electrical cabinet. Although total sales were less than 100, the SD38-2 proved to be a reliable workhorse with many continuing in service today.



ScaleTrains is scheduled to release an HO scale model of an EMD SD38-2 locomotive early next year. The Rivet Counter Series model accurately replicates EMD's six-axle prototype. Southern Pacific models will reflect prototypes as they appeared in the 1980s and '90s with operating LED front and rear red, white and green classification lights.



LED lighting features on all road names of ScaleTrains SD38-2 will have illuminated number boards, directional headlights, and tricolor class lights.



Where appropriate to the road name being modeled, Rivet Counter SD38-2 models will have operating LED ground lights, ditch lights, and beacons.



In addition to the Southern Pacific Bloody nose version, road names and paint schemes available on this release will include BC Hydro (yellow and red), two Elgin, Joliet & Eastern schemes (Bicentennial, and orange), Louisville & Nashville (gray and yellow), Frisco (red and white), and two Yankee Dock schemes (Can Do America, and red, white and gray). ScaleTrains SD38-2 models will be available DC/DCC-ready and with DCC and sound.

Info: www.scalettrains.com



Tangent Scale Models has released its third HO scale caboose, the Illinois Central (IC) Centralia Shops Wide Vision



Caboose. The caboose is being offered with two roof options, a Stanray "reverse-diagonal" Roof, used on 100 cabooses produced in 1970, and a Pullman Standard "bow-tie" panel roof used on 100 cabooses produced in 1972.



The models feature Keystone cushion underframes, full brake system details, underframe detail variations, side window variations, wide vision cupola window

options, end platform tread plate, and see-through steps and two styles of Apex running boards. The interior of the model is detailed with bunks, lockers, ice chest and oil bunker. Interior and exterior lighting features are track powered and wand controlled, including marker lights as appropriate.



Paint schemes produced include as-built IC "Original orange split rail 1970," Illinois Central Gulf (ICG) "Orange I-Ball repaint 1974+," ICG "Simplified orange repaint 1978+," ICG "Simplified orange

repaint 1987+," IC "Gray repaint 1988+," Chicago Missouri & Western (CM&W) "Red repaint 1988+," MidSouth Rail Corporation (MSRC) "Gray repaint 1989+," Canadian National (CN) "Red repaint 2005+," CN "Red repaint 2007+," Ready-To-Run "IC/ICG orange unlettered 1980+ with Stanray roof," "Ready-To-Run IC/ICG orange unlettered 1980+ with Pullman roof," and undecorated as-built kit versions of the caboose with each roof style.



The cabooses include new Barber 70-ton roller bearing caboose trucks with power pickup and 33" standard .110" tread CNC machined metal wheels. .088" scale wheels are available separately.

Kadee scale couplers are included except for the undecorated kits, for which the modeler provides their preferred coupler.

Info: www.tangentscalemodels.com



R. Bale

EMD F40PH LOCOMOTIVE

The F40PH is a four-axle 3,200hp B-B diesel electric locomotive built by General Motors Electro Motive Division in several variants from 1975 to 1992.

Intended for use on Amtrak's short-haul passenger routes, the F40PH became the backbone of Amtrak's diesel fleet. The F40PH performed well for Amtrak. Trains magazine estimated that on average, each F40PH traveled as many as 175,000 miles a year. The F40PH also found widespread use on commuter railroads in the United States and with VIA Rail in Canada. The designation F40PH stands for the following: "F" for the full-width cowl car body, "40" as the locomotive is part of EMD's 40-series (based on the GP40-2 freight locomotive), "P" for passenger service and "H" for head-end power. Three ex-Amtrak F40PHs have been preserved in Boulder City, NV, at the California State Railroad Museum in Sacramento, and at the North Carolina Transportation Museum. San Diego's North County Coaster plans to donate two of its F40PH to the Pacific Southwest Museum in Campo, and the Southern California Railway Museum in Perris.



Walthers has announced plans to release an EMD F40PH diesel locomotive next winter. The HO scale model is based on a Phase 2b prototype. Walthers economy

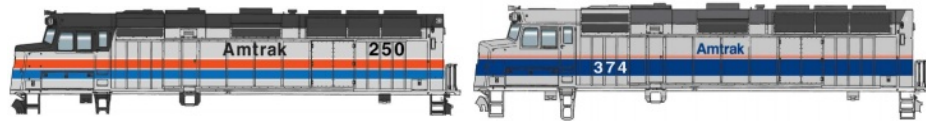
priced Mainline Series model will have drill starter points for grab irons (sold separately) molded into the correct locations on the locomotive body. The five-pole skew-wound motor, gearing and drive system is the same as used on the WalthersProto locomotives. Availability is scheduled for winter 2023.



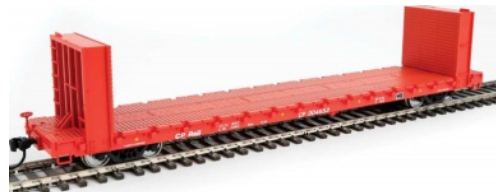
Road names on this release will be CSX, Metra, Grand Canyon and VIA.



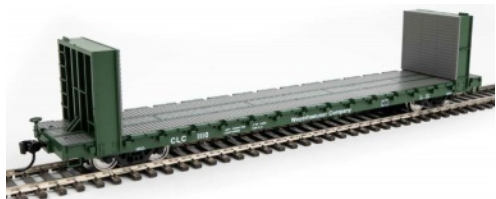
Amtrak locomotives will be available in three schemes: Phase II, Phase III, and Phase IV.



The model will have constant and directional LED headlights, factory-installed vertical hand rails, and metal knuckle couplers. DC and DCC-ESU Sound units will both be available in this release.



A Mainline Series Pullman-Standard 60' bulkhead flatcar is also coming from Walther's next winter. Features include 8' 6" tall bulkheads and 70-ton roller bearing trucks with 33" machined metal wheelsets.



Road names will be BNSF, Canadian National, Burlington Northern, Canadian Pacific, Trailer Train TTX-PTTX and Weyerhaeuser.



Walther's has included a Trinity 3281 cu. ft. twin-bay covered hopper in its winter 2023 production schedule.

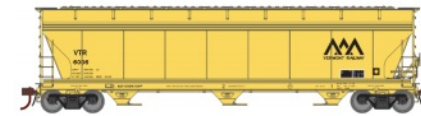


The Mainline Series model will be available in four road number for Blue Circle Cement, Chicago Freight Car Leasing, CIT Group, CSX, Halliburton, and Norfolk Southern. All Walther's rolling stock mentioned in this report

will come with Proto MAX(TM) metal knuckle couplers.

Info: www.walthers.com

N SCALE PRODUCT NEWS



Athearn's January 2024 production schedule includes several versions of an N scale ACF 4600 cu. ft. triple-bay covered hopper. Three body styles will be available: Early production (high side ladder and brake wheel, single side stiffener), Mid production (low brake wheel, short side ladders, single side stiffener), and Late production-post 1971 (low brake wheel, short side ladders, double side stiffeners).

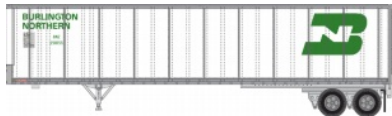


Road names on this release will be Soo Line, Akron, Canton & Youngstown; Vermont Railway, Santa Fe, Union Pacific, and Western Pacific. Details on all road names include screw mounted 100-ton trucks with 36" machined metal wheels, and body-mounted operating knuckle couplers.

Athearn is preparing new tooling for an N scale 45' Fruehauf Z-van. The initial release of the new trailers will be in January



2024. Two body styles (smooth sided and rib side) are being tooled with two rear door styles.



Details include a formed wire landing gear crank, separately applied mud flaps, and positionable dual bogies. Road

names on the initial release will be Burlington Northern, Clipper, Transamerica, and XTRA Lease.



Athearn has included this N scale 53' CIMC container in its January

2024 production schedule. The model features a horizontal rib front. The stackable magnetic containers will be available decorated for STG Logistics, Schneider, Exel, COFC Logistics, and EMP. The containers will be offered in a 6-pack with different numbers.

Info: www.athearn.com



R. Bale

SD45 DIESEL LOCOMOTIVE

Beginning in the early 1960s America's railroads began shopping for high horsepower locomotives that could accelerate fast and maintain high speed for an extended period. EMD's answer was the SD45, a 3,600hp beast built around a huge 20-cylinder prime mover. The imposing six-axle SD45 introduced the distinctive concept of flared radiator intakes at the rear of the body. Numerous railroads bought the SD45, but the early success of the locomotive faded as the massive 20-cylinder prime mover revealed a tendency to break crankshafts. EMD came up with a fix to the problem, which was attributed to engine block flex; but the SD45's reputation had been severely damaged. Known as a fuel guzzler, the SD45's reputation was further harmed as fuel prices soared in the 1970s.



Atlas is creating all-new tooling for an EMD SD45 road switcher. The N scale model will be available decorated for Southern Pacific, Erie Lackawanna, Burlington Northern, Pennsylvania Railroad, Norfolk & Western, Norfolk & Western (Bicentennial), NY&SW. and Denver & Rio Grande Western.



R. Bale

FAIRBANKS MORSE H-16-44

Fairbanks Morse introduced the 1600hp 8-cylinder H-16-44 road switcher in 1950. More than 350 of the locomotives were completed when production ended in 1963. Midway through the production period, the H-16-44 was updated with raised walkways and changes in the hood to simplify production. The general appearance was similar to F-M's larger Trainmaster, but with four axles rather than six. Internal upgrades centered on replacing the Westinghouse electrical system with a more robust control system supplied by General Electric. The final H-16-44 was built for the Ferrocarril de Chihuahua al Pacifico Railroad in 1963. This was the last locomotive produced by Fairbanks Morse.



Atlas plans to release an N scale version of a Fairbank-Morse H15/16-44 road switcher during the first quarter of 2024. The Master Series model will be based on the Phase 1 body style of both the H15-44 and H16-44 that was produced between 1947 and 1952.



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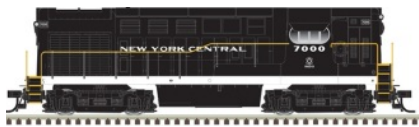
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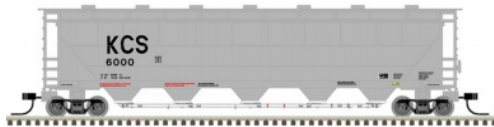


Options include F-M or AAR trucks, high or low-mounted headlights, early or late-production Phase 1 hoods and removable fuel tank skirts.



Road names will be Jersey Central, New Haven, New York Central, Rock Island, Long Island, Pennsylvania Railroad, Southern, and Union Pacific. All Atlas Master

Series Gold locomotive models have a factory installed ESU LokSound decoder. Atlas DC Silver models have a next18 connector for the installation of an aftermarket DCC sound decoder.



New N scale freight cars coming from Atlas during the third quarter of 2023 include this Trinity PD5000 covered hopper.



Road names will be Kansas City Southern, Norfolk Southern, ADM, FCSX-CLI Industries, CAGX-Conagra Mills, NAHX-FCC Catalysts, and NAHX-Grace Davison.



An N scale model for this 52' 70-ton gondola will be available from Atlas during the third quarter of next year. In addition to Southern Pacific, road names will include Conrail, Delaware, Lackawanna & Western; Delaware & Hudson, Pennsylvania, SCL, and Western Pacific.

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By the beginning of WWII, most USRA double-sheathed wood boxcars had been rebuilt with steel sides.

Rebuilding continued and by the late-1940s about 14,000 of the original 24,500 USRA DS cars had been rebuilt with variations in the ends and doors. Atlas has scheduled the release of an N scale USRA steel rebuilt boxcar in early 2024. Features of the Master Series model include wire grab irons, 10-panel sides, 7-8 or 5-5-5 ends, and Youngstown doors.



Road names will be Canton Railroad, Chicago, West Pullman & Southern; Georgia Railroad, Great Northern, Penn Central, Santa Fe, and Wellsville, Addison & Galetton. All Atlas N scale rolling stock comes with AccuMate knuckle couplers. Info: shop.atlasrr.com



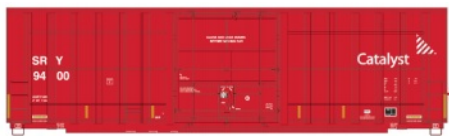
ExactRail is booking advance orders for a new release of its N scale Trinity 6275 cu. ft. plug-door boxcar.

Delivery is planned for February 2023. During the mid-2010s, TTX began re-painting and applying its new "Forward Thinking" logo to its fleet.



LRS GATX began receiving an updated version of the Trinity 6275 boxcar in 2020.

The Catalyst scheme of the Southern Railway of British Columbia was applied to a fleet of 50' high-cube cars received from Trinity in 2006. In 2019, TTX repainted one of its FBOX boxcars pink to



support finding a cure for breast cancer. ExactRail is offering N scale models in both the original scheme and the subsequent repaint.



Details on ExactRail's N scale version of the Trinity 6275 include Micro-Trains couplers and 100-ton ASF Ride Control

trucks with machined 36" metal wheelsets.

Info: www.exactrail.com



KatoUSA has announced an N scale model of the

Union Pacific #4014 4-8-8-4 Big Boy locomotive. The model features dual coreless motors with brass flywheels, weights placed along the body and in the cylinders to provide balance and weight distribution, a tinted LED headlight, and details to match the 2021 excursion tour appearance, with an oil tender, graphite firebox, silver cylinder head and piston covers, and the builder's plate.



The locomotive will be capable of running on 11" radius curves with both driver sets articulated, and all 16 driving wheels are powered. Electrical pickup is through both drive sections and the tender. DC, DCC, and SoundTraxx DCC versions will be available. The models should arrive mid-2023.



BNSF Swoosh and TTX New Logo have been added to KatoUSA's selection of five-unit Gunderson MAXI-I double stack car sets.

Each five-unit set comes with 10 removable 40' containers. Each container has a magnet and metal plate to hold it securely in place.



Availability is planned for May 2023. Info: www.katousa.com



RailSmith is producing a set of fluted diner cars in N

scale. The Atlantic Coast Line diner "Moultrie," is one of ten diners built by Pullman and delivered in 1950. It was used on the Florida Special name train.



The Louisville & Nashville fluted diner



"Fiesta Inn" was built in 1946 by AC&F for the Hummingbird and Georgian trains. The

model features a later paint scheme.

Budd built diner 461 in 1948 for the New York Central system. It was one of 16 cars Budd built for the NYC that year. The car will feature the dark gray NYC lettering boards used in later years.



The fluted diner "Sam Houston" was one of two lightweight,

streamlined diners built by Pullman in 1948 for the Texas Special.

In 1948, Pullman-Standard built the "Golden Banquet" for the Rock Island for use on the Golden State train. This model portrays it later



in life with the lettering board reading Rock Island instead. This car will not have full skirts. The cars will be available separately or as a complete "Fluted Feast" set of five in Summer 2023.
Info: lowellsmith.net



R. Bale

BARREL ORE CARS

Beginning in 1967 National Steel Car built a series of covered pellet ore cars for Canadian National and Ontario Northland. The cars were designed specifically to deliver iron ore pellets from mines owned by Dominion Foundries and Steel Co. (Dofasco) in Northern Ontario to their mill facility in Hamilton. The closed design of the cylinder-shaped hopper cars was to keep the processed iron-ore pellets from freezing or becoming damp with excess moisture. The barrel cars had a device that resembled a tire on a shaft extending upwards from each of the loading hatches. As the cars moved through the loading area, a pair of elevated ramps, called "Scrolls," engaged the tires forcing the hatches open. It took about 60 seconds to fill each car. The initial design was for 35' cars which proved to cause excess wear on rails of the same length. Production of an improved 42' car began in 1973. It was not unusual to see both CN and ONR cars mixed in the same consist. In later years, CN converted a few barrel ore cars to scale test cars.



Rapido is developing an N scale version of Canadian National and Ontario Northland ore cars. Both 35' and 42' versions of the unique enclosed ore car are being prepared.



Decorating schemes will include both short and long barrel cars decorated for CN in Mineral Brown.



Short barrel ONR cars will be available in Progressive Green. ONR's blue and yellow Chevron scheme will be available on long barrel ore cars. A short CN scale test car and undecorated models will also be available.



Features include full underbody and gate details, separate air piping, see-through etched metal end platforms and 100-ton Barber S-2 trucks with metal wheels. Availability is expected during the second half of 2023. Orders are being booked now with an order deadline TBA.

Info: www.rapidotrains.com

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R. Bale

COIL STEEL CARS

Sheet steel has long been a major component in the manufacturing of many different products including tanks, household appliances, industrial shelving, machinery, freight cars, and especially automobiles.

Cold-rolled or hot-rolled, varying in width from less than an inch to ten feet, and ranging in thickness from 1/64th of an inch to 1/4th of an inch, the steel was originally cut into sheets to customer specified lengths. After World War II, winding the steel strip into a coil almost completely replaced the sheets. The steel coil with 3,000 to 5,000 square feet of steel is easier to handle and transport than a stack of steel sheets. The biggest challenge for railroads and the automobile industry, the primary user of coiled steel, was how to transport it efficiently. In the 1960s, the Ford Motor Company, working with the Detroit Toledo & Ironton and the Chesapeake & Ohio railroads, developed a design for a coil steel car. The original design was a heavy-duty frame with two 24-foot troughs covered by hoods made of thin steel. Several freight car builders built coil steel cars, including Thrall Car Manufacturing, which built 48-foot, twin hood cars in the 1980s and 1990s. With the protective hoods in place, the car can carry coils up to 7 feet in diameter. They can carry coils up to 10 feet with the hoods removed. The flat-top hoods from the original designs have since been replaced with a round top design that is both easier to manufacture and is stronger.



ScaleTrains.com is developing an all-new N scale model of a 48' coil steel car. The Rivet Counter model replicates a double-hood prototype Thrall introduced in 1994.



positionable coil steel load dividers.



In addition to Santa Fe, road names will include two BNSF schemes, Central of Tennessee Railway & Navigation, Illinois Central, two Norfolk Southern schemes, and two Union Pacific schemes. Availability is scheduled for about July 1, 2023.

Info: scaletrains.com

STRUCTURES & SCENIC SUPPLIES



Athearn's January 2024 production schedule includes a Ford C series tractor with Hackney beverage trailer. The injection-molded models feature a cab interior, clear window glazing and rubber tires. Ford built the C series of trucks in a variety of chassis configurations between 1957 and 1990.



Decorations schemes in the 2024 release include Fire Rescue, City Fire Department, JO JO Chocolate Flavored Drink, Old Colony Root Beer, Penguin Ginger Ale, and Black Horse Ale.

Info: www.athearn.com



Atlas is quoting 2023 third quarter release date for HO and N scale models of a 1978 Ford Fairmont four-door sedan. The car will be available in black,

light chamois, silver metallic, jade metallic, medium chestnut, medium blue, and cordovan metallic.



An N scale 1992 Ford F250/F350 truck will also be available decorated for Amtrak, Burlington Northern, Canadian National, CSX, Southern Pacific, Long

Island Railroad, and Herzog, and Ferromex.



Four door Crew Cab trucks will be available in orange, yellow and white.

Info: shop.atlasrr.com



Coastmans Scenic Products has introduced a kit that builds into a prototypical sawdust/woodchip/slash burner in HO scale. Typically known as wigwam burners due to their shape, the sawdust burners were a common feature at lumber and plywood mills until EPA regulations banned their use. Many remained standing for years after they

were taken out of service. 3D-printed with PLA, the completed structure stands 6.25" in diameter and 7.26" tall. A 2 ½ hour YouTube video is online to assist in construction, as well as 14 pages of full-color instructions.

Info: www.coastmans.com



Frenchman River Model Works is selling an O/On30 Rooftop Dust Collector that is appropriate for almost any industrial building. The item is highly detailed with rivets and expanded metal platform. The dimensions are 1" in diameter and the main body without the lower tubing is approximately 3" tall.

Frenchman River has also introduced the Armstrong Barrel and Box Company in O scale.



Consisting primarily of cast resin walls, the kit contains Tichy doors and windows, a wooden loading dock, an industrial rooftop dust collector, and a wooden rooftop water tank. The kit measures approximately 9" wide x 8" deep x 9" tall when built according to the directions.

Info: frenchmanriver.com



Inter-Action Hobbies has an HO scale craftsman kit named Giordano's Grocers and Cold Storage. The well-detailed industrial structure has rail side service on one side and truck access

on the other. In addition to the main structure, the kit includes a water tower, lean-to corrugated storage building, and a storage shed with chain link cage area.



The kit includes laser-cut windows, doors and glazing, crates, hand trucks, and sack castings. 3D printed details include power meters, electrical box and a propane tank. An interior LED lighting kit is

included along with corrugation tooling and foil, and a door handle bending jig.

Info: www.interactionhobbies.com



New 1:87 scale vehicles for **Oxford Diecast**

include a 1949 Oldsmobile Rocket 88 coupe and a 1957 Dodge D100 pickup truck in Omaha Orange and black.



blue 1969 Dodge Charger Daytona and a red 1959 Pontiac Bonneville coupe.

Info: www.walthers.com

Completing Oxford's latest release is a bright



Walthers has scheduled the release of three container chassis next summer. The HO scale models will be available for 20', 40' and 53'

containers. Each size will be available in 2-packs decorated in blue, orange, and black. Undecorated models will also be available. Landing gear in both up and down positions will be included with each chassis.



The 40' and 53' chassis will have positionable tandem bogies.



Walthers is preparing to release three versions of a basic gas station structure. The Cornerstone kit will be available as a Vintage Gas Station, above, from the 1960s and as an updated gas station from the post-1980s period (below). The kits include appropriate period details, color graphics, and roadside and roof-mounted signs. An aged asphalt parking lot

with stress cracks is sold separately (#933-3544). Vehicles and people in the above illustration are not included.



The interior includes an office with counter, two lifts for service bays, and numerous details including oil displays, soda and ice machines, tire stands, utility meters and an air compressor. Two complete islands with period pumps, oil displays and nonworking lights.



The station is also available as a quick oil change business. The main building has a footprint of 10.5" x 9". Each of the three kits require painting and assembly.



A gas station detail kit is also coming from Walthers. All of the items are injection molded

in white plastic and require painting.

Info: www.walthers.com



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! BRIEFLY NOTED AT PRESS TIME ...

Con-Cor's 2022 Christmas car is a lightweight RPO with a O'Christmas Tree carol theme. Both HO and N scale versions will be available ...

New HO scale Proto models coming from **Walthers** in 2023 include an EMD SD9. A long list of Mainline models scheduled to arrive next year include a high-hood Phase II GP9, a set of 24' Taconite ore cars, a 40' ACF welded boxcar, a 72' Center Beam flatcar, a 60' P-S door-and-a-half auto parts car, a 53' cylindrical covered hopper, a 53' Railgon gondola, and both standard and extended cupola versions of an International wide-vision caboose. Kits for accessory items due in 2023 include a 97' Warren truss bridge, a large steel warehouse, a ranch house, a craftsman-style bungalow and Chooch flexible brick sheets in nine N and HO scale patterns ...

InterMountain has just released new HO scale models for an ACF twin-bay covered hopper and a 50' PS-1 boxcars with double sliding doors ...

Kadee has released a Milwaukee Road twin-bay coal hopper with offset sides ...

White River Productions has released the 2022 edition of the HOn3 Annual ... ■

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DECEMBER

Please check with any organization hosting an in-person event for the latest status of the event.

Ongoing 2022

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.scalettrains.com/roadtrip

December 2022 – January 2023

ILLINOIS, MATTOON, January 21-22, 2023. Cross County Mall Train Show. 700 Broadway Ave East.

Info: Jim Ruef, (217) 317-3009

KANSAS, MCPHERSON, January 14-15, 2023. Model Train Convention & Expo. McPherson Community Building, 122 E Marlin St.

Mailto: staff@mcphersoncountymakerspace.org

MASSACHUSETTS, ORLEANS, December 17, 2022. Nauset Model Railroad Club Holiday Open House Days. Rear Lower Level, Hilltop Plaza, 180 Rte 6A.

Info: www.nausetmodelrrclub.com

MASSACHUSETTS, WEST SPRINGFIELD, January 28-29, 2023, Railroad Hobby Show, sponsored by the Amherst Railway Society. Eastern States Exposition Fairgrounds, 1305 Memorial Avenue.

Info: www.railroadhobbyshow.com

MICHIGAN, FARMINGTON HILLS, January 22, 2023, 2nd Annual Model Railroad Sale, hosted by Division 6, NCR-NMRA. Costick Community Center, 28600 W Eleven Mile Rd.

Info: www.ncrnmra.org

MISSOURI, ST. CHARLES, January 7, 2023. Trainfair 2023, sponsored by the St. Charles Model Railroad Club. St. Charles West High School, 3601 Dr.

Info: www.stcharlesrailroadclub.org

NORTH CAROLINA, HENDERSONVILLE, December 17, 2022. French Broad e'N'pire Model Railroad Club Open House. 5033 7th Ave E.

Info: www.facebook.com/events/1662176470841399/1662179954174384

TEXAS, PLANO, January 21-22, 2023. Dallas Area Train Show, 2000 East Spring Creek Parkway.

Info: dfwtrainshows.com/page/dallas-area-train-show-january-21-22-2023

WISCONSIN, STEVENS POINT, January 21-22, 2023. Arctic Run - Central Wisconsin Model Railroader's 25th Annual Model Railroad Show. Holiday Inn Convention Center Hotel, 1001 Amber Ave.

Info: Jim Miller, (715) 340-0265 jimb67@gmail.com or Don Anderson (715) 340-8105 crm114@tds.net

Future 2022-2023 by location

NEW ZEALAND, MOSGIEL, DUNEDIN, May 6-7, 2023, Dunedin Model Train Show. Taieri Bowling Club, Wickliffe Street.

Info: dunedinmodeltrainshow@gmail.com

ALABAMA, MOBILE, March 4-5, 2023. SWARM Model Train Show, sponsored by the South West Alabama Railroad Modelers. Mobile Via Health, Fitness, and Enrichment Center, Arlene F. Mitchell Campus, 1717 Dauphin Street.

Info: www.facebook.com/profile.php?id=100070094629309 or Glenn Samuel Gasamuel@aol.com

CALIFORNIA, HEMET, April 15-16, 2023. Model Railroad Festival of modular layouts, including California South Coast On30, Orange County HO, ZoCal Z scale, and Puerta Margarita mini-layout. Exhibits include Riverside and Chula Vista Live Steamers, SoCal Railroad Museum, and a Mini Car show. Four Seasons, 237 Seasons Blvd.

Info: Dave Balser, on30man@gmail.com or 760-436-6139

GEORGIA, CARTERSVILLE, March 11-12, 2023. The 2023 Piedmont Division 25th Anniversary Model Train Show. Clarence Brown Conference Center, 5450 Georgia Highway 20.

Info: www.themodeltrainshow.com

ILLINOIS, DUPO, April 8, 2023. The Sons of The American Legion Spring Train Show. Dupo American Legion Post #485, 200 S 5th St.

Mailto: comptrain2002@yahoo.com



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ILLINOIS, ST. CHARLES, June 11, 2023, Kane County Railroadiana & Model Train Show and Sale. Kane County Fairgrounds (Front Building), 525 South Randall Rd.
Info: www.rrshows.com

KENTUCKY, LOUISVILLE, March 18, 2023, 33rd Annual Division 8 Train Show and Sale. Holy Family Parish Saffin Center, 3938 Poplar Level Rd.
Info: div8-mcr-nmra.org

MISSOURI, PACIFIC, February 18, 2023. Pacific Eagles Train Show. 707 W. Congress St.
Mailto: floraselectrictrains@yahoo.com

MISSOURI, ST. LOUIS, March 11, 2023. Boeing Employees' Railroad Club – St. Louis Railroad Swap Meet. Greensfelder Recreation Complex at Queeny Park, 550 Wiedman Rd.
Info: www.berrc-stl.com/V3.0p/index.html

NORTH CAROLINA, NEW BERN, March 4, 2023. Carolina Coastal Railroader's 27th Annual Train Show. Riverfront Convention Center, 203 South Front Street.
Info: carolinacoastalrailroaders.org

OREGON, CORVALLIS, March 18, 2023. Winterail 45 railroad photography exposition and rail collectible sale. Corvallis High School, 1400 Northwest Buchanan Ave.
Info: www.winterail.com

OREGON, ELSIE, March 11, 2023. Pacific Model Loggers' Congress. Camp 18 Restaurant and Logging Museum, Milepost 18, 42362 Highway 26.
Info: pacificmodelloggerscongress.org

OREGON, PORTLAND, March 11, 2023, Willamette Model RR Club Annual Swap Meet. Kliever Armory, 10000 NE 33rd Drive.
Info: wmrrc.com

TEXAS, GRAPEVINE (Dallas Area), August 20-26, 2023. NMRA National Convention, Gaylord Texan Resort & Convention Center, 1501 Gaylord Trail.
Info: www.2023texasexpress.com

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TEXAS, GRAPEVINE (Dallas Area), August 25-27, 2023. National Train Show, Gaylord Texan Resort & Convention Center, 1501 Gaylord Trail.
Info: www.nationaltrainshow.org/2023/ntsdfw.html

TEXAS, PASADENA (Houston), February 18, 2023. The Greater Houston Train Show, sponsored by the San Jacinto Model Railroad Club. Pasadena Convention Center, 7902 Fairmont Parkway.
Info: sanjacmodeltrains.org

VERMONT, ST. ALBANS, March 11, 2023, Vermont Rails Model Railroad Show, sponsored by the Northwestern Vermont Model Railroad Association. Collins Perley Sports & Fitness Center, off Exit 19 of I-89.
Info: www.nwvrailroad.org ■

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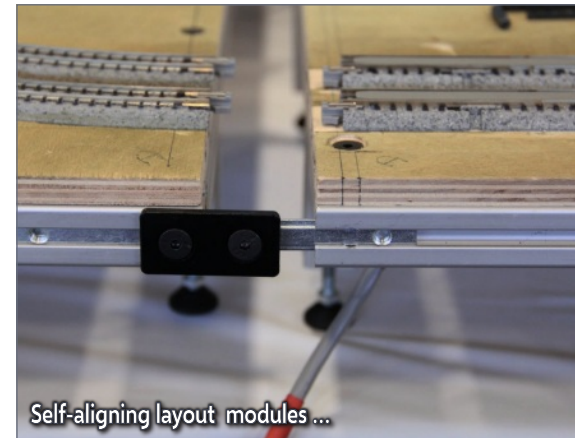
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