The Keystone Modeler

Pennsylvania Railroad Technical & Historical Society

No. 83 Winter 2013

Inside:

The Keystone Modeler
Pennsylvania Railroad Technical & Historical Society

Published Quarterly by
The PENNSYLVANIA RAILROAD
TECHNICAL and HISTORICAL SOCIETY
A non-profit organization

MEMBERSHIP INFORMATION
PRRT&HS, PO Box 54, Bryn Mawr, PA 19010-0054

PRRT&HS MONTHLY E-NEWS
Keystone-e-news-request@lists.keystone-pubs.org?Subject=subscribe

FRONT COVER, TOP
Chuck Cover's PC70BR Café Coach on his layout. (Jim Hunter)

FRONT COVER, MIDDLE
Bruce Smith's Burlington Refrigerator Express wood reefer. (Bruce Smith)

FRONT COVER, BOTTOM
On the left is one of Irish Tracklayer's US&S A5 electro-pneumatic switch machines. On the right is Tim Garner's scratchbuilt air compressor and tank assembly to make it "work". (Tim Garner)

BACK COVER
At the top, three Baldwin diesels meet at Willsburgh, Pa. on Tim Garner's Willsburgh Division. Left to right are a BF16 freight shark, a BP60 passenger Centipede, and a BP20 passenger Shark. Below, an A-B-A set of BF16 sharks moves a freight west in the morning mist at Amandale. (Both photos, Tim Garner)

The Keystone Modeler

Manuscripts and photographs submitted for publication are welcome. Materials submitted are considered to be gratis and no reimbursement will be made to the author(s) or the photographer(s) or his/her representative(s). The Society reserves the right to reject, for any reason, any material submitted for publication.

Please contact the editor for information and guidelines for submission. Photo files 800x600 pixels or larger in JPG format are preferred. Statements and opinions made are those of the authors and do not necessarily represent those of the Society.

The Keystone Modeler on CD-ROM

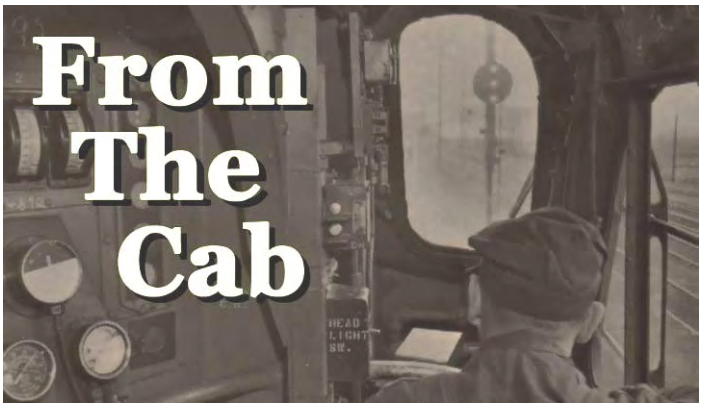
Disc 1	August 2003 to July 2004	*TKM* Nos. 1 – 12
Disc 2	August 2004 to July 2005	*TKM* Nos. 13 – 24
Disc 3	August 2005 to July 2006	*TKM* Nos. 25 – 36
Disc 4	August 2006 to July 2007	*TKM* Nos. 37 – 48
Disc 5	August 2007 to July 2008	*TKM* Nos. 49 – 60
Disc 6	August 2008 to Autumn 2009	*TKM* Nos. 61 – 71
Disc 7	Winter 2010 to Autumn 2010	*TKM* Nos. 72 – 75
Disc 8	Spring 2011 to Winter 2012	*TKM* Nos. 76 – 79

Each disc is $15.00. There is also a disc containing all issues from 1 to 48 for $60. If you are a resident of Pennsylvania, please include PA sales tax. Send a check or money order in US dollars payable to PRRT&HS to:

Jim Hunter
4306 North Victoria Way
Harrisburg, PA 17112-8641

To **subscribe** to **The Keystone Modeler**, click on the link below and send:
mailto:the-keystone-modeler-request@lists.keystone-pubs.org?Subject-subscribe

To **unsubscribe**, click on the link below and send:
mailto:the-keystone-modeler-request@lists.keystone-pubs.org?Subject-unsubscribe



An E-zine such as this, with no advertising and dependent on voluntary contributions, is always in need of submissions. Inevitably, I appeal to the readers for more articles. Some readers, I'm sure, feel that their latest modeling efforts are not something they want to submit. So here is another idea.

Jerry Britton suggested to me in an email that *TKM* should publish some articles about layouts. I think that our readers would definitely be interested in articles like that. Why should *MR* and *RMC* get all the glory? I understand why someone would like to see his layout in a paper magazine that will even pay for the story, but articles that are about the same layouts, written up just a little differently, could be published here. I can think of three or four layouts that have appeared in print which could be presented in *TKM* with new text and previously unpublished photographs. (It so happens that this month in *MR* there is an article about Jimmy Deignan's Middle Division layout which has had an interesting history.)

Some of us have visited layouts on tours that were very impressive. We often ask the builder of the layout if we can take pictures, and then we may ask questions about how he decided to focus on a particular location, or achieved a particular scenic effect, or constructed a particular structure. Those photos and questions are exactly what would go into an article!

I would welcome an article about a PRR-themed layout with previously unpublished text and photos. Don't worry about whether it has already been seen by people on tours after a convention; not all attendees go on the tours, and lots of folks can't attend the annual meetings in the first place. There are also layouts that have never appeared in a magazine or never been on tours. Of course, you have to get permission to do this from the owner of the layout, and the owner must be recognized and given the credit for what is shown.

In this edition of *TKM*, we offer an article by Tim Garner about seldom-modeled switch details, Chuck Cover's café car, and Part 1 of Bruce Smith's reefers.

Jim Hunter, Editor

The Pennsylvania Railroad Technical & Historical Society

The purpose of the Pennsylvania Railroad Technical & Historical Society is to bring together persons interested in the history and modeling of the Pennsylvania Railroad, its subsidiaries and its acquired companies. Our goals are to promote the preservation and recording of all information regarding the organization, operation, facilities, and equipment of the PRR.

The Society's quarterly illustrated journal, *The Keystone*, has been published continuously since 1968. Each issue of 64 or more pages contains illustrated original authoritative articles about locomotives, cars, other equipment, facilities, and operating practices of the PRR. The Society also publishes its own thoroughly researched books and other materials concerning PRR history. *The Keystone Modeler* is also a quarterly special 30-plus page online publication of the Society.

The Society meets annually, usually during a weekend in early May, providing an opportunity for its members to get together and learn more about the PRR. Local chapters around the country also provide members and guests with regular meetings that feature PRR related programs.

Information about our Society may be found on our website – www.prrths.com. To join the Society, send $35.00 to:

PRRT&HS
PO Box 54
Bryn Mawr, PA 19010-0054

All memberships are for a calendar year, back issues of The Keystone for the current year are sent upon joining. Overseas membership has added postage fees.

PRRT&HS Interchange

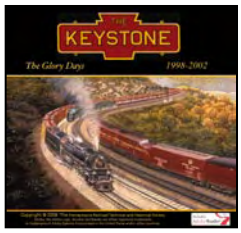
Selected Society Merchandise of Interest to Modelers

PRR Equipment Drawings on Microfilm

Copies of PRR equipment drawings are available from the Society's microfilm collection. To order drawings, you must know the drawing number and title. Ordering information and lists of arrangement drawings are available on the Society's website. Go to www.prrths.com, select National Society, and then The Interchange. If you require a printed copy of this information, please send your address and a check for $2.00 made out to PRRT&HS to:

Richard C. Price
779 Irvin Hill Road
McVeytown, PA 17051

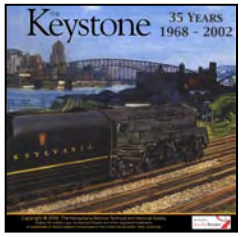
The Keystone CD 5



The Keystone CD No. 5, The Glory Days, covering 1998 to 2002, is now for sale at the price of $75 for members. New Jersey residents add $5.25 sales tax. Order CDs from:

Al Buchan
785 Cornwallis Drive
Mt. Laurel, NJ 08054-3209

The Keystone DVD 1



The Keystone DVD No. 1 covering 35 years of *The Keystone* from 1968 to 2002 is available. The navigation of this product is being upgraded as are some of the administrative notes and text. The improved edition will be ready for ordering soon. Those few who have already purchased the DVD will be able to trade it in for a new one when it's available. The price of this DVD is $375. ***This DVD requires a computer with a DVD drive. It is NOT a video disk that can be played on a DVD player for viewing on your TV.***

The Keystone Modeler NEWSWIRE

With Steve Hoxie

First, a sad note. The model railroad hobby has lost Martin Lofton of Sunshine Models who passed away last month. Martin was a pioneer in the prototype modeler movement in the hobby. He made it possible for us to have accurate models of distinctive prototypes and signature cars from a wide variety of roads, cars which would not be expected to have sales figures high enough to interest the major producers. It is interesting to note that only after Sunshine began producing PRR X31 boxcars did Bowser begin to make them for us. Martin's wife Tricia partnered with him and intends to keep the firm in business. A listing of their models is available here: http://www.sunshinekits.com/ .

Since Jim discussed *TKM*'s allegiance to prototype modeling in the last issue's *From The Cab*, I thought you might find interesting these three narratives discussing the recently concluded Prototype Rails in Cocoa Beach, FL. Look for our own Greg Martin.

- http://modelingthesp.blogspot.com/2013/01/prototype-rails-at-cocoa-beach-2013.html
- http://modelingthesp.blogspot.com/2013/01/prototype-rails-at-cocoa-beach-2013_28.html
- http://modelingthesp.blogspot.com/2013/02/prototype-rails-at-cocoa-beach-2013.html

Last, this column is somewhat shorter than in previous issues. There is a simple reason: we have so many models available right now and announced for later this year. For example: the Bowser H30 in HO. This is a long sought after model, and finally Bowser has risen to the challenge. I am expecting this model to fly out the door of your hobby shop without ever getting to the shelves. And then there is the Broadway Limited H10. Just these two models will make 2013 a very good Pennsy year!

PRR Product News

ATLAS MODEL RAILROAD CO.
http://www.atlasrr.com/
PRR Alco S-2—HO Scale

Atlas has announced an Alco S-2 Switcher produced from new tooling. A sound version will be available. PRR numbers to be offered are #5659, #9106, and #9108. Expected arrival is 3rd quarter 2013.

BOWSER MANUFACTURING
http://www.bowser-trains.com
PRR H30 Covered Hopper – HO Scale

(Bowser Photo)

Previously we cited the **Bowser** announcement of the H30 as part of their ready to run Executive Line. It has now been announced that the models are expected fall 2013. Paint schemes and specific car numbers are available on the web site. The photo below shows the O Scale Weaver model.

FOX VALLEY MODELS
http://www.foxvalleymodels.com/
PRR H30 Covered Hopper—N Scale

Fox Valley has announced plans on their Facebook page for the H30 in N with metal wheels, body mount couplers, and fine details. Expected availability is late 2013.

MOUNT VERNON SHOPS
http://www.mountvernonshops.com/
PRR Pilot Assignment Decals--HO Scale

John Frantz has available HO decals displaying locomotive division and enginehouse assignments suitable for the period 1920-1951. Enough data is included for four locomotives with the same assignment. Every PRR enginehouse is included. Additional sets are planned for 1951-56 and after 1956.

THE COACH YARD
http://www.thecoachyard.com/
PRR P70 and P70R Coaches—HO Scale

Reservations are being accepted by **The Coach Yard** for brass, professionally painted coaches lettered with no stripes, suitable for pre-1948, and in the three stripe scheme. Availability is TBD.

Upcoming Events

March 22 – 23 Greensburg, Pennsylvania
RPM-East Railroad Prototype Modeler Seminar
http://www.hansmanns.org/rpm_east/

April 13 - 14 Timonium, Maryland
Great Scale Model Train Show
http://www.gsmts.com/

May 16 – 19, 2013 Lancaster and Strasburg, Pennsylvania
PRRT&HS Annual Meeting
http://www.prrths.com/

July 14 – 20, 2013 Atlanta, Georgia
NMRA Annual Convention and National Train Show
http://www.nmra2013.org/

More for modelers at the…

45th PRRT&HS Annual Meeting

May 16-19, 2013

Host Inn, Lancaster, Pa. and Railroad Museum of Pennsylvania, Strasburg, Pa.

PHILADELPHIA CHAPTER, HOST

This year the convention format will be different from previous years. There will be approximately two dozen presentations divided equally between history and modeling. On the modeling side, speakers will include Elden Gatwood, Ben Hom, Jim Hunter, Larry Kline, and Bruce Smith – all veteran contributors to *TKM*. In addition, on Friday, May 17th, there will be a mini-symposium entitled, "PRR from Prototype to Model." The symposium will highlight five PRR prototype layouts. Speakers will include Chuck Cover (Shamokin Branch), Neal Schorr (Middle Division), Andy Rubbo (Northeast Corridor-New York Division), Pete Forbes (Philadelphia Terminal Division-Frankfort Junction), and Bill Neale (Panhandle Division). Following the talks there will be a panel discussion led by Doug Gurin exploring various aspects of trying to recreate the PRR in model form.

Everyone is encouraged to bring models for the model room. Much like Railroad Prototype Modelers meetings, we would also like to see people bring works-in-progress as well as completed models. In order to encourage the exchange of ideas, we will have a "Meet the Modeler" session prior to the annual Modelers Forum. All those who bring models are asked to attend the "Meet the Modeler" session so they can answer questions. On behalf of the organizing committee, we look forward to seeing all of you at what will be a very exciting meeting.

Ron Hoess

For more information, keep visiting the Annual Meeting web site at:

http://www.prrths2013.com

Modeling a PRR PC70BR Café Coach

By Chuck Cover, photos by the author unless noted

Builder's photo Café Coach #1112. (PRR photo)

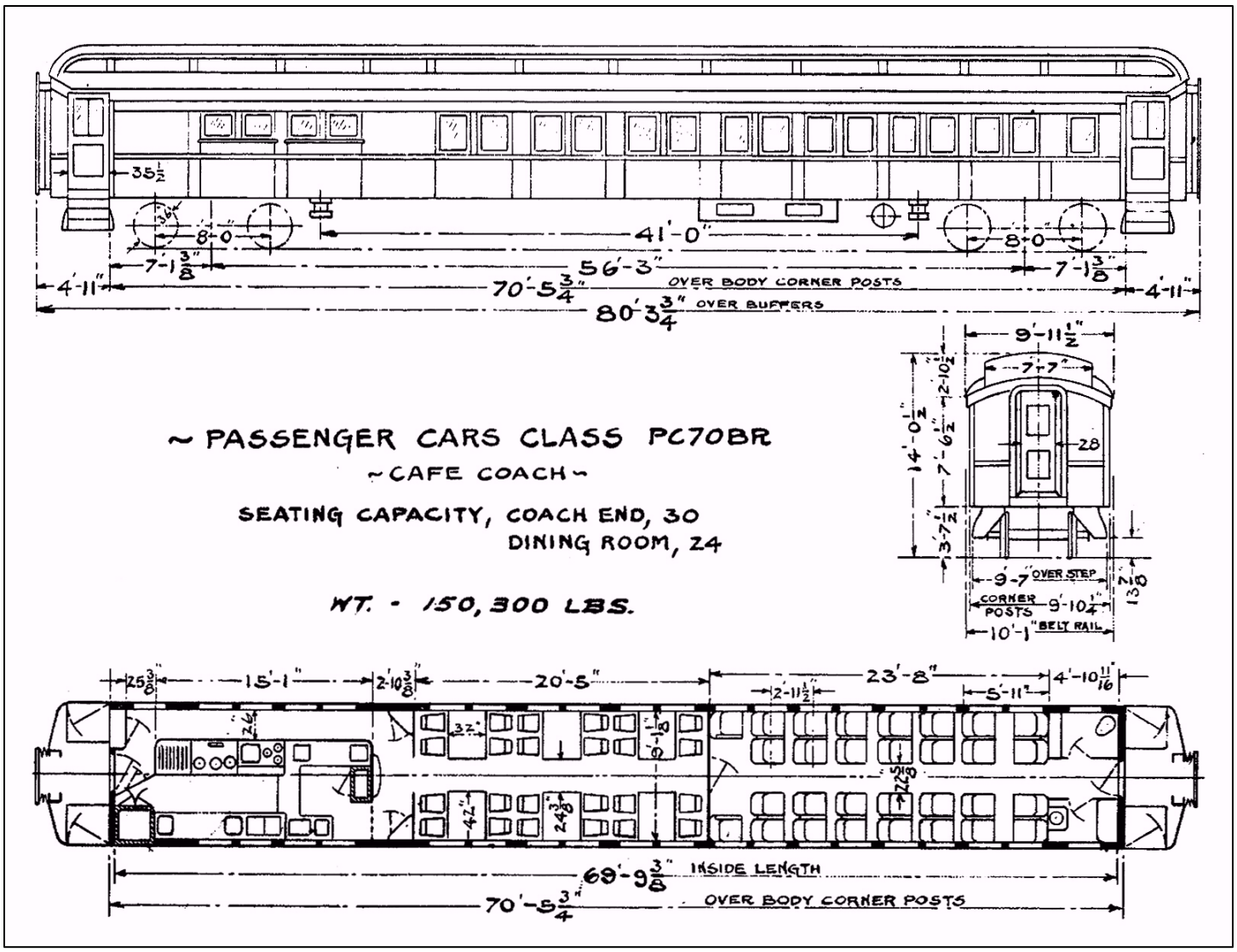
I am finally getting around to modeling the two daytime passenger trains that ran on the Northern Central mainline between Williamsport and Harrisburg in 1955. The *Susquehannock* was essentially a local during those years and references (1, 2) that I have seen listed the consist as a B60, P70KR/P70GSR, and a PL-Coach/Buffet. The Buffalo Day Express had a consist of B60 baggage cars, P70KR/P70GSR coaches, and a Parlor Café Car (between Buffalo and Washington) as well as additional mail and baggage equipment. I have already built the P70KR coaches (from the Steve Hoxie *TKM* article, November 2007), the B60 baggage cars, and have collected a variety of other head end equipment. The last thing on the list is the parlor/buffet cars that were found on those trains.

The Bethlehem Car Works Parlor/Restaurant Plan 4019A kit served as one of these cars. The article in *The Keystone*, Volume 22, No.1 Spring 1989, pages 18-34, lists several of the Plan 4019 Parlor cars as being used on the Northern Central day-time passenger trains in the 1940s and 50s. One source for the consists lists the Parlor/Coach/Buffet with 8 parlor seats, 10 table seats and 24 coach seats. For modeling purposes, I was unable to come up with a good match for a car with this configuration, but I did find several references for a Café Coach, which has 30 coach seats and 24 dining room seats. I decided the Café Coach would give me a car, different from the Plan 4019 Parlor, to run on one of my passenger trains.

In 1954 there were 8 PC70 class cars on the roster. Cars 1108, 1109, 1110, and 1111 were built by Pullman in 1927. Cars 1112, 1114, 1115 and 1116 were built at the Altoona Car Shops (ACS) in 1930 and received refrigerated ice bunkers in 1934. There are several photos of Café Coaches as well as diagrams of these cars. After examining the available drawings and photos, I decided to model one of the cars built at ACS and that the best starting point would be a P70 coach. For HO modelers, there are three choices as a starting point, ALCO, Eastern Car Works, and Bachmann. Although the ALCO/ECW models seem to have slightly better detail compared to the Bachmann, I chose the Bachmann P70 because I wanted to use the Bachmann trucks on my Café Coach. The ALCO/ECW trucks supplied with their kits must be assembled and in my opinion are not as good, especially in operations, as the Bachmann trucks.

Disassembly

Begin by disassembling the Bachmann P70. First remove the roof and window glazing which are one piece. Turn the car over and look for 6 tabs that extend through the floor. With a screw driver, disengage these tabs and push up so that the roof separates from the sides of the car. Be careful prying off the roof so that you do not damage the car sides or roof. Remove the interior, including the seats, light boards, trucks and swivel coupler mechanisms.



Drawing of PC70BR

The Café Coach has three sections, a coach section, a dining/buffet section and a kitchen. As one examines the drawings and photos, the kitchen side of the car, from right to left, has a lavatory window, 4 coach windows (coach section), then 3 sets of windows with wider window spacing and windows (dining/buffet section) and then 2 sets of shorter kitchen windows. On the opposite side of the car, aisle way side, from left to right, there is a similar arrangement of the lavatory window, then coach and dining sections, but in place of the kitchen windows there are 2 sets of coach windows and a single window at the right end of the car where the aisle runs past the kitchen.

Replacing the Windows

Some of the windows on the P70 coach must be removed and replaced with New England Rail Service windows. On the kitchen side, starting at the right end, leave the lavatory and first 4 sets of coach windows but remove the rest of the Bachmann windows. Using a #17 X-Acto blade or single edge razor blade, scribe along the car side making numerous cuts into the body at the level of the tops and bottoms of the coach windows until the section can be removed. On the aisle side, leave the lavatory and 4 coach windows in place. Remove the next 4 sets of coach windows, leaving the last 2 sets and a single coach window on the right end of the car side.

Once the window sections are removed, take the replacement windows from NERS and carefully square and even the openings so that the replacement windows will fit into the openings. The NERS #200 paired Pullman windows are slightly wider than the Bachmann coach windows and are spaced lightly farther apart. Use these for the dining/buffet section of the car. Use the kitchen windows from the NERS #212 set and 0.040" styrene sheet for the blank sections on the sides. Use the drawings to place the NERS windows in the proper location and styrene solvent glue to weld them to the Bachmann sides.

Kitchen side with Bachmann windows removed.

Kitchen side with windows installed.

Kitchen side close-up of dining section windows.

Kitchen side close-up of kitchen windows.

Aisle side with windows for removal marked.

Aisle side with windows removed.

Aisle side with dining section windows installed.

Aisle side close-up dining section windows installed.

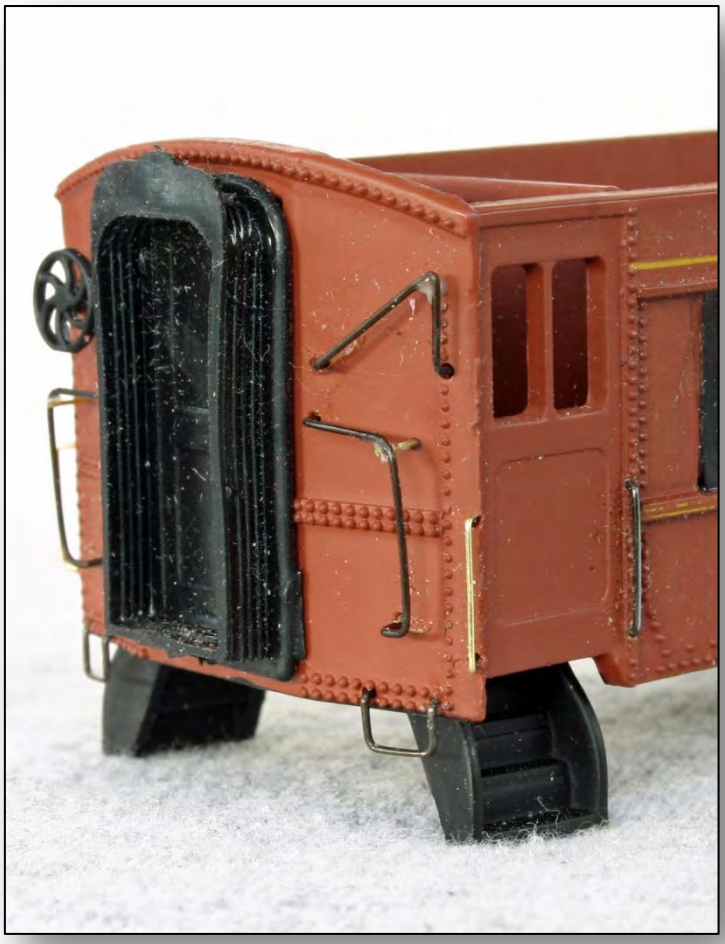
Once the windows are dry, sand the glue line seams. Some of the rivet detail will be destroyed during this process, especially those between the replaced windows. Using photos and Micro Mark #84985 Rivet Detail – HO, replace the lost rivets on the exterior of the car. I found the Micro Mark rivets decals very easy to use. They are less expensive than the Archer rivets, and each sheet contains more rivets than an Archer set.

Now is a good time to work on the couplers. Cut the coupler boxes from the rotating couple mechanism that was removed from the car. Substitute Kadee #5 couplers and springs for the Bachmann couplers and mount the Bachmann coupler boxes on each end (they were fine on my car).

The ends of the car have fairly good detail. I did add uncoupling levers using 0.012" brass wire and DA #2206 eye bolts and Walthers rubber diaphragms. I also added grab irons on the four corners by each door.

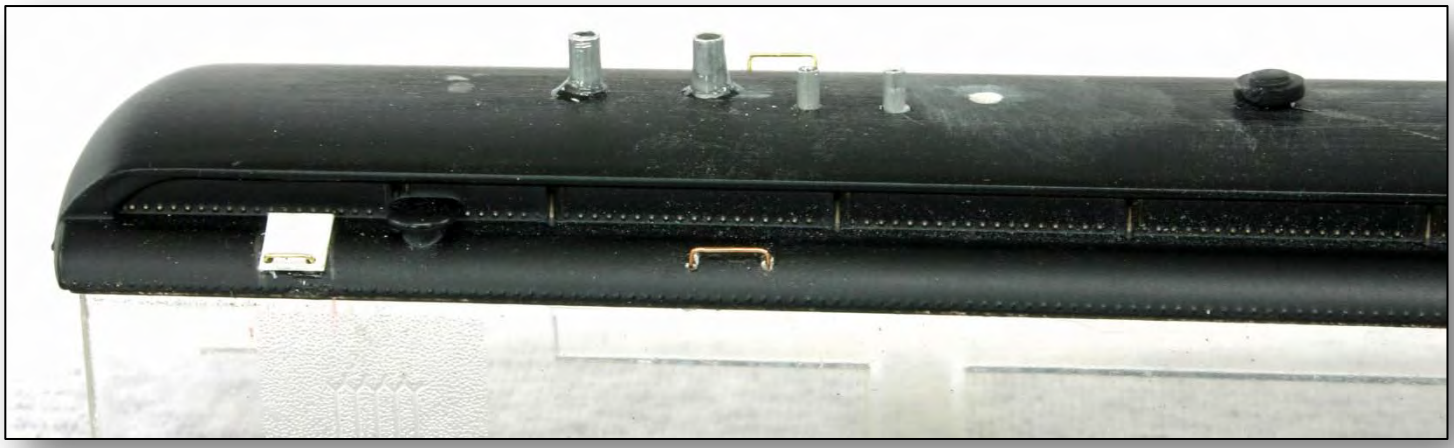
Use the Bachmann roof. There are 4 roof exhaust stacks above the kitchen area, two larger diameter stacks, centered on the roof and two smaller diameter stacks located slightly toward the kitchen side and middle of the car. For the larger stacks, use 3/32" OD tubing and for the smaller use 1/16" OD tubing. Drill appropriate size holes in the roof and glue the tubing in place using 5 minute epoxy. There is an ice hatch on the kitchen side which can be simulated with a piece of 0.20" sheet styrene and 0.012" brass wire as a handle. There are also several other grab irons to facilitate access to the roof. Two roof vents (ECW roof vents per Steve Hoxie's article) are also located along the center of the roof, one above the lavatories and one at the end of the kitchen section. See photos and drawings for the correct placement.

The Bachmann roof assembly includes the styrene windows which slide along the sides of the interior of the car. Part of the styrene window must be removed on the hallway end of the car because it has lavatory glass for the P70 coach. Carefully remove just this portion of the styrene windows. I am not sure of the best way to do this, as I used a nipper but cracked a large portion of the styrene window. I ended up removing all of the styrene windows on that end of the car. In doing this, I lost one set of the clips that hold the roof tight to the sides. I had to glue a short piece of square tube to the roof of the car and use a long bolt through the floor to hold the roof in place. For the missing windows, I used transparency film, which was installed after painting the car.

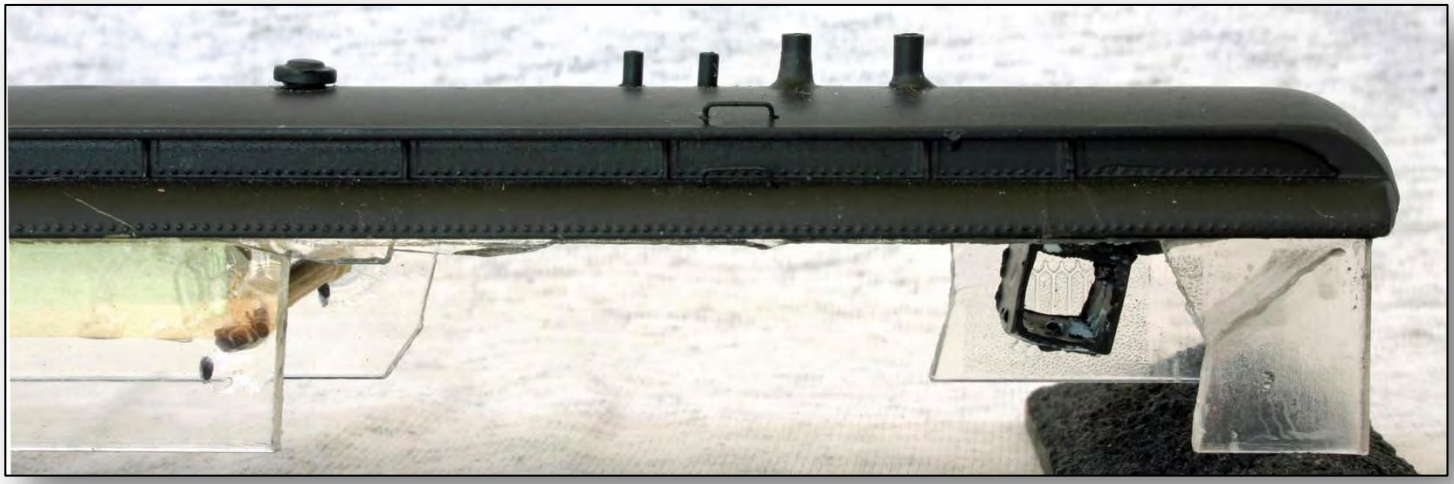


¾ view of end detail.

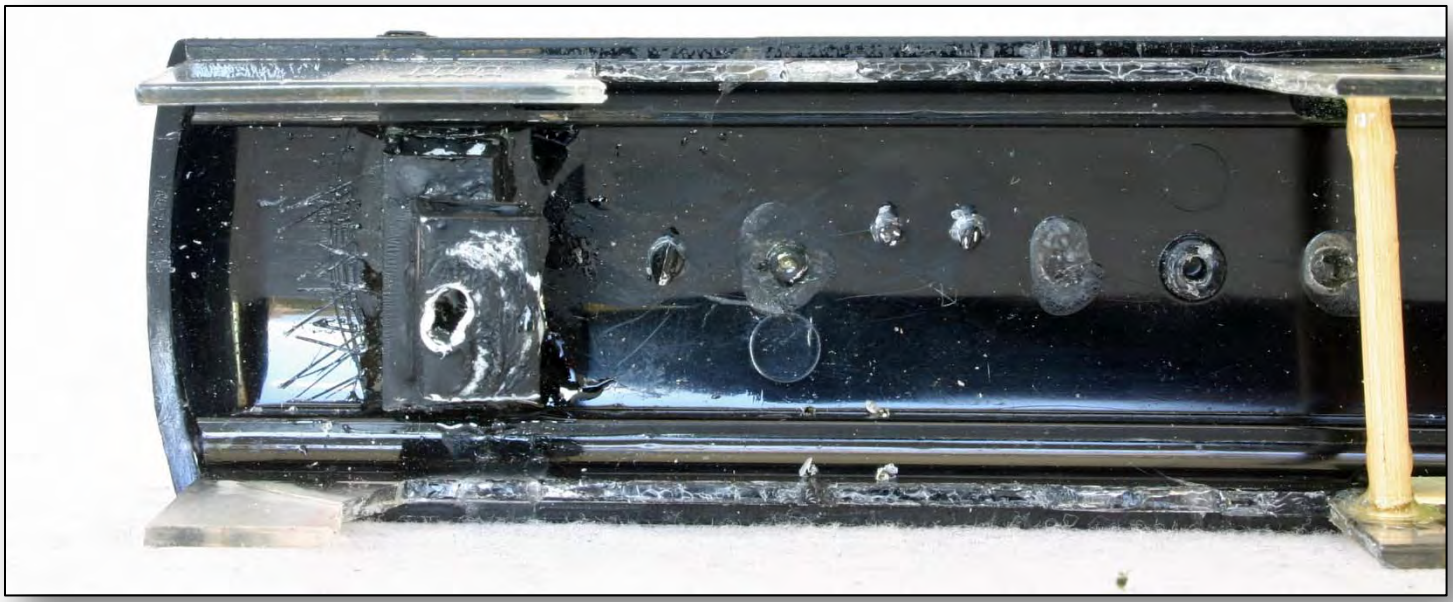
End view of end detail.



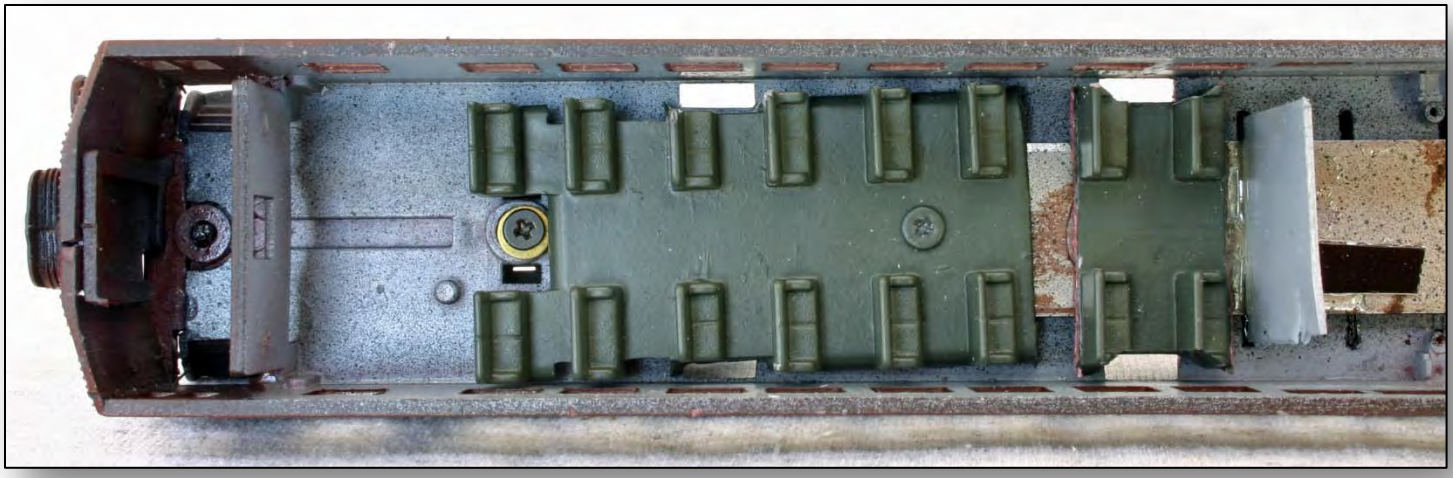
Side view of roof detail.



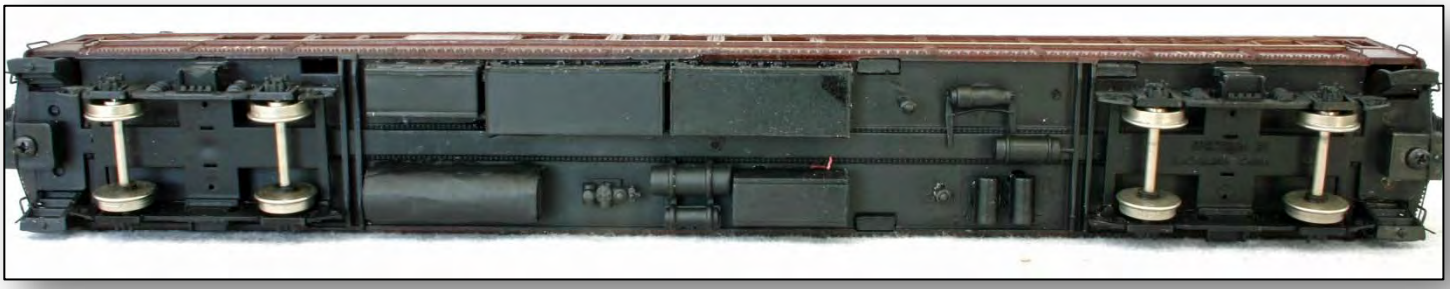
Side view of broken Bachmann windows and square tube to secure roof.



View of inside of car and square tube to secure roof.



View of inside of car, note Bachmann seats and bolt and washer securing trucks.



Underbody detail.

Interior

Cut down the Bachmann seats to the proper length for the coach section of the car and slide them in place. I have not yet found good tables and chairs for the dining/buffet section of the car but will detail that section later. The kitchen section was modeled simply by constructing a barrier, simulating the kitchen/aisle (hallway) wall, and placing it about 30 scale inches and parallel to the hallway side of the car. The interior of the car was painted a medium gray. Once the paint dries, place masking tape on the walls, covering the doors and windows so that the exterior paint will not leak into the interior.

Underbody

With only a few photos to use as a reference, the underbody detail was somewhat of an educated guess. Some of the Bachmann details were left on the car. Since the cars were air conditioned, double ice air conditioning unit (NERS #252) was added to the kitchen side of the car, and a large water reservoir was added to the hallway side. I wrapped one of the Bachmann water tanks with black construction paper to simulate the water tanks that I had seen in some photos.

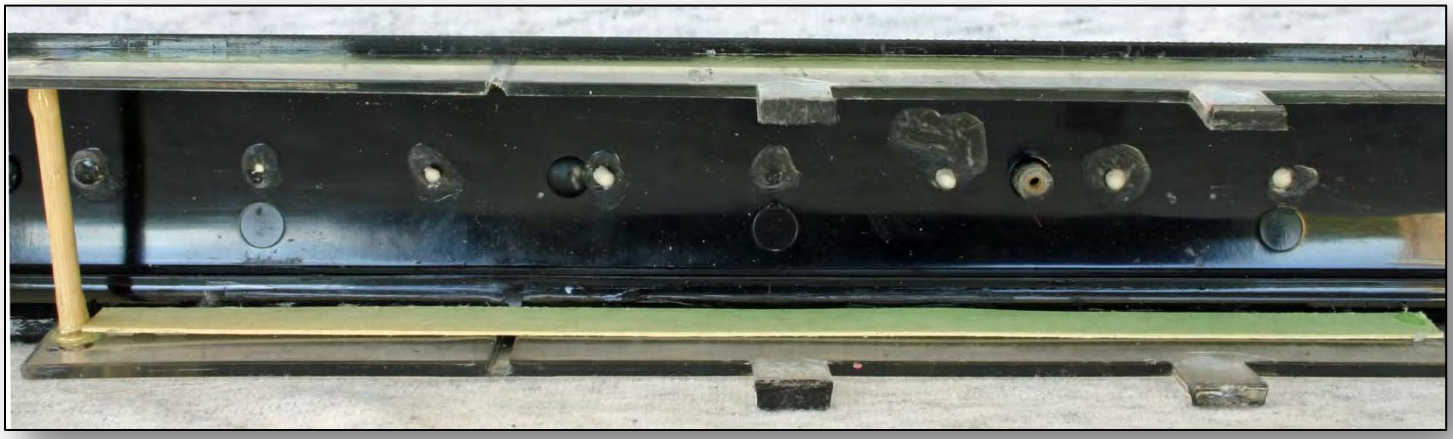
Final Painting and Assembly

Use your favorite primer on the exterior of the car. I used flat black. After the primer is dry, use Scalecoat II Tuscan Red for the car body. I left the roof and underbody flat black. The car was decaled with a mix of decal sets. One can use Middle Division, HPS-10 and HPS-15 for the Pennsylvania, stripes and numbers and Champ PH-4D for the words "Café Coach". An overspray of Dullcote was used to give a slightly weathered look.

Transparency film was used for the windows and door windows at the kitchen/hallway end of the car where I broke the Bachmann windows. After the transparency film was installed, I used 0.012" brass wire for the railing along the hallway windows. Window shades were made from construction paper and glued to the inside of the Bachmann windows in the coach and dining sections. I next installed the trucks. The trucks have a stem that goes through the floor into the interior of the car. Use a small screw and washer to fix the trucks in place. Carefully slide the roof/window assembly back in place and make sure that the tabs snap in place on the underside of the car.

This, my first kit-bash of a passenger car, was a fun project. Using the Micro Mark rivet decals was a positive experience, and I will look for more projects to use this product. I now have two cars to use on my passenger trains to provide the riders food and beverage as they travel along the Susquehanna River.

Thanks to Owen Thorne and Steve Hoxie for research advice and helping me find parts for the project. All photos and drawings are from my collection.



Window shades in dining and coach sections.

Close-up of aisle windows.

REFERENCES:

- Rob's PRR Page (www.prr.railfan.net) Consists of Inter-Regional Passenger Trains, April 28, 1957
- PRR Form 1, Timetable Northern Division Passenger Schedule Table 32, 9/25/55 and PRR Form 16 Timetable New York to Buffalo, 4/24/55

PHOTOS IN LITERATURE

- Train Shed Cyclopedia No. 8, Passenger cars from the 1931 Car Builders Cyclopedia, Newton K Gregg Publisher, 1973, p 509, figure 1033 side view PC70B PRR 1112 Café Coach and figure 1032 dining compartment of Café Coach, and p 468, figure 853 passenger compartment of Café Coach.
- *The Cars of the Pennsylvania Railroad,* n.d., Wayner Publications, p 10, side views of Café Coach 1112, and 1107.
- Pennsylvania Railroad Heavyweight Passenger Equipment Plan and Photo Book, N.J. International, Inc. 1984, p 62 photo of PC70BR Café Coach 1107, p 63 Drawings of PB70BR Café Coach 1112. 1114, 1115, 1116, and p 65 photo of PC70BR Café Coach 1115.

(Two photos) Finished car on layout, kitchen side.

Finished car on layout, aisle side.

Finished car on layout, aisle side.

The Susquehannock *along the river.*

Modeling FGE/WFE/BRE Refrigerator Cars Part 1: BRE Reefer Upgrade

By Bruce Smith – model and photos by the author

Some of you are probably wondering "Why is there an article about Burlington Refrigerator Express cars in TKM?" As was detailed by Bill Welch in the Special Winter 2008 Issue of *TKM*, Fruit Grower's Express (FGE), Western Fruit Express (WFE) and Burlington Refrigerator Express (BRE) were three of the companies that made up a group of refrigerator car companies that provided refrigerator and ventilator car service throughout several regions of the United States. These companies were known collectively as "our companies". With headquarters in the same building in Alexandria, Virginia and shared management, these companies formed a cooperative group that optimized utilization of their cars for varying harvest seasons and locations with the cars behaving basically as a single fleet.

As a consequence, the PRR modeler can model cars from these three companies according to the total number owned by each company. In general, this should result in a ratio of approximately 6 to 3 to 1 for FGE, WFE and BRE respectively. The refrigerator car fleets of these companies often presented a varied array of cars, especially in the steam era, when many of their cars represented earlier designs from previous owners. Following the creation of FGE, BRE and WFE, standard designs were implemented in each fleet, although these did not always cross over between companies. For example, during the 1920s, FGE created two designs that became the bulk of their fleet.

Other cars are iconic for the WFE and BRE fleets. When modeling the fleets of these companies, building a roster that represents the "flavor" of these fleets can be challenging, but it is possible. The easiest approach is to build most of the fleet from "signature" cars and fill it out with some of the rarer cars.

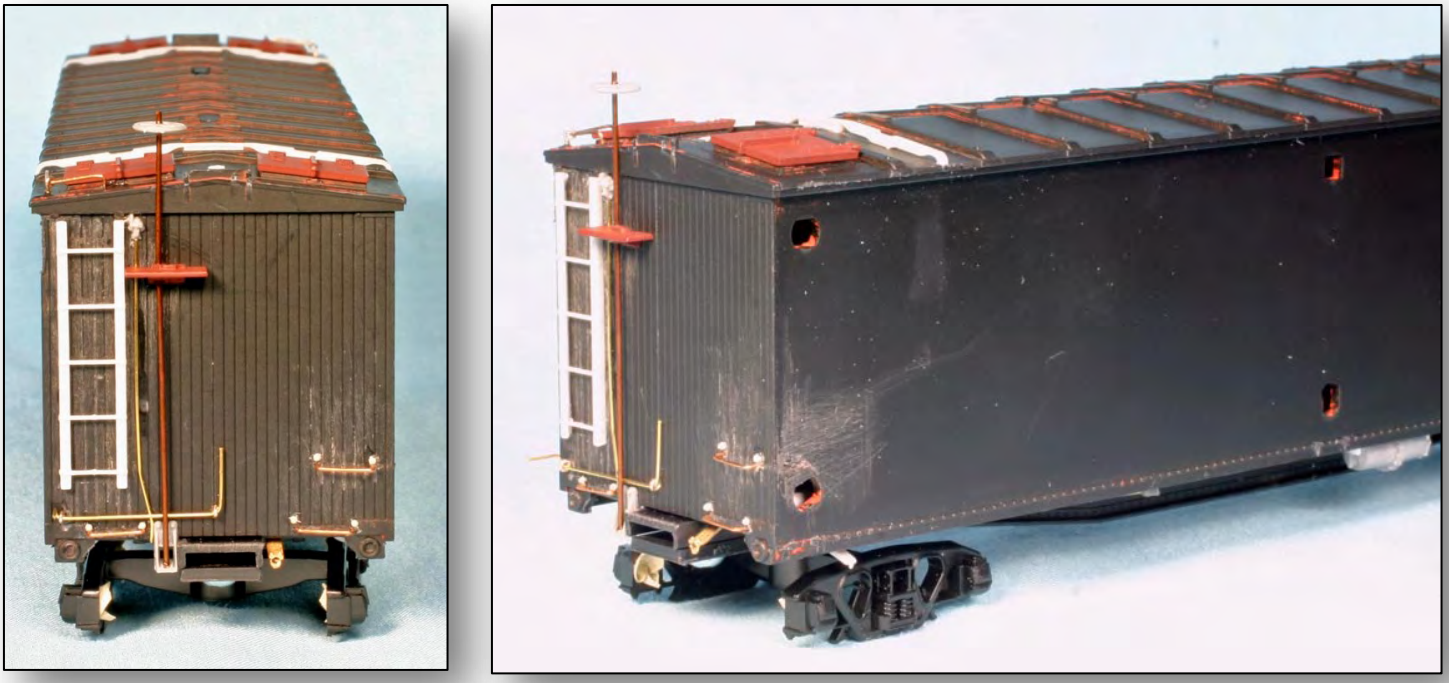
This article will focus on a signature car of the BRE fleet, a classic wood-sided refrigerator car. In 1922-23, the Chicago Burlington and Quincy purchased 1,000 cars that were built to specifications very close to a car which had been proposed as a USRA design during WWI but was not used at the time.

The Santa Fe Refrigerator Dispatch Co. (SFRD) also built refrigerator cars that were similar to the USRA design in large numbers, while the B&O and FEC built a small number of similar cars. An additional 300 cars were purchased by Burlington subsidiaries Colorado and Southern (C&S) and Fort Worth and Denver (FW&D) (200 and 100 cars respectively). The cars were assigned to the 75000-75999 series on the CB&Q, the 50050-50249 series on the C&S and the 20001-20100 series on the FW&D. They were absorbed into BRE in May, 1926 and thereafter carried BREX reporting marks but kept their original numbers. Over the years, the cars received several changes. These included new roofs (identical to FGE/WFE cars) and roof hardware, different end fascias (flat bottom rather than peaked) and AB Brakes to name a few. Modifications began before WWII, but unmodified cars could be found into the late 1940s and perhaps even early 1950s.

These cars represent one the easiest of any of the FGE, WFE and BRE cars to model, especially in HO scale. The starting point for the model is the Accurail wood refrigerator car (series 4800). In fact, this model is reasonably accurate for these cars as modified and can be used as-is if that fits the level of detail that satisfies your needs. However, there are a number of modifications that can be made to enhance details on this car, making it a fun and relatively easy upgrade project. (Note: Some *TKM* readers have recently requested "easier" projects. Along those lines, readers are free to use as much or as little of the changes outlined in this article, but I encourage you to do a bit more than you are comfortable with. By pushing your comfort level, you will ultimately increase your skill.) In working on this project, I followed many of the suggestions in Bill Welch's excellent article on these cars in *Railroad Prototype Modeling*, Volume 1 (Speedwitch Publishing, 2005). In his article Bill offers many useful ideas including how to backdate the model to the "as built" appearance. I decided to model the car with the modified roof and fascia making the project easier. I also changed a number of approaches due to the availability of "standard" FGE/WFE/BRE details such as ladders, hatch rests, drains, etc. on parts sprues from Intermountain ($0.75 each). Although the car has been offered in BREX paint, the scheme was not 100% correct for my era (1944) and so I decided to start with an undecorated car.

Sides

Since molded-on grab irons and ladders aren't my style, I carefully shaved off the grab irons and ladders using a chisel point hobby knife blade. These areas were then sanded to smooth them out. A "shadow" of these details remained where they filled the grooves between the boards. The grooves in the boards were then rescribed with the back of a hobby knife blade or a scribing tool. New holes (#78) were drilled for wire grab irons where the old grab irons were located and brass grab irons were glued in place with ACC. Additional holes were drilled just above each grab iron and Tichy nut-bolt-washer castings were placed in these to model the attachment bolts for the grab irons. Examination of photos



End on and ¾ views of the B end of the refrigerator car. Note that roof modifications including grab irons and hatch rests are also visible.

showed that many cars had sheet metal over the doors, which was replicated with a piece of 0.010" styrene, with an Archer rivet in each corner. Intermountain ladders from their FGE refrigerator car were used on the right end of the sides. These ladders were painted black separately and added later.

Ends

The ends received the same treatment as the sides with the exception that the ladders were glued on, as they were painted the same oxide red as the ends. The brake platform from the Accurail car was used. A Tichy retainer valve was glued to the end and then 0.010" brass wire was bent for the retainer line. The bottom support for the brake staff from the Tichy sprue was added, as well as the brass wire brake staff from the kit and a Tichy brake wheel. I also added uncoupling levers by putting in two brass eyes and then bending 0.012" brass wire to fit.

Roof

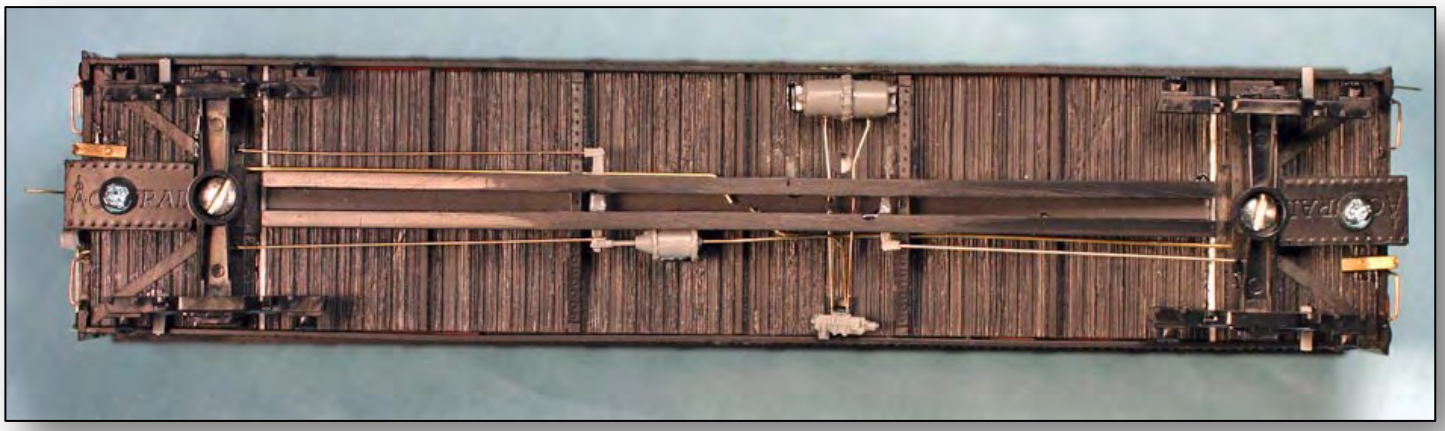
The hatches and running board were removed and the hatches saved for later use (although Intermountain hatches could be used here). The molded-on grab irons and hatch rests were carefully shaved off. As with the sides and ends, wire grab irons were added; in this case these had a right angle bend in the middle. Unfortunately, they needed to be rebent to actually fit. The middle support for these was a Detail Associates 2206 eyebolt. Intermountain hatch rests were glued in place with solvent cement. The old running board mounting holes were plugged with styrene which was glued in and cut off flush when dry. Scale 2"x6" lumber was cut into lengths for the roof walk boards. These were added to the car after it was grit blasted.

Underbody

This is where the majority of work went into this car. The model, while representing the fishbelly USRA underframe well, has a 5'6" distance from the end sill to the center of the truck. The prototype cars, however, had a 5' distance from the trucks from the ends. While you may think that 6" does not matter, cars with the 5' spacing are visibly different from those with the longer spacing.

To generate the correct spacing, the bolsters were cut out of the underbody, cutting flush on the side towards the middle of the car and leaving one board attached on the side toward the end. The bolsters were then rotated 180 degrees and glued to the ends of the underbody. Because the saw kerfs remove some material, a shim of styrene was added between the bolster and the center of the underbody to bring the underframe to the correct length. This can be seen in the photo of the underbody.

Holes were drilled in the center sill, cross bearers and bolsters for the trainline which was bent in two pieces from 0.019" brass wire. Note that to make the holes in the cross bearers, the holes were drilled down at an angle from each side. This effectively makes a vertical slot and allows for imperfect hole location without causing a huge headache! The Tichy AB reservoir valve and cylinder were used instead of the rather coarse Accurail parts. The reservoir was propped up on two pieces of 0.020" x 0.080" strip styrene and the cylinder was elevated to match the cutouts in the Accurail center sill. The Tichy brake levers were used with 0.012" brass wire to form the brake system, and the ends of the brass wire were bent and placed into holes drilled in the bolsters.



Underbody view showing the modifications described.

I drilled two holes through the center sill for the pipes from the reservoir to the AB valve and 0.012" brass wire was bent to fit. Holes were drilled in the floor between the bolster and the end of the car, and Intermountain ice bunker drains were mounted. Make sure that these clear the trucks! Finally, Precision Scale brass air hose brackets were mounted on each end after drilling the U-bolt portion out with a #74 bit so the air hose could fit.

These cars used Andrews trucks, so the Accurail trucks were set aside for another project and Life-Like (now Walthers) Proto 2000 Andrews trucks were mounted on the car. After putting small pieces of tape on the bearing surfaces, the car was ready for grit blasting and painting.

Completed BREX refrigerator car. Note the unpainted board on the roof walk. These represent a recent repair.

Painting and Lettering

The black Archer rivets on the panels of the doors were an issue with the yellow paint (they showed through). To help cover these, the car sides were painted with Poly Scale "new gravel grey" first. Then the issue of the proper yellow color for the sides came up. In some ways, I like Poly Scale "PRR Buff", which is TERRIBLE for real buff as it is way too yellow, but has that darker cast that BRE (and FGE/WFE) paint sometimes had.

After the first coat, I thought it looked too grey/green so I mixed it 1:1 with Poly Scale signal yellow, which produced a satisfactory color. The Accurail car was easy to paint, since it disassembles into the parts perfectly for paint separation. Prior to painting, the roof walk boards were installed. On this particular model, I left the end 3 boards off. These were added after painting to represent a repair that has yet to be painted. The ends and roof were painted with Poly Scale Mineral Red, and the underbody was painted with Poly Scale Steam Loco black.

Cal Scale air hoses were installed in the brackets (although today I would use the rubber Hi Tech Details air hoses). Decals from Microscale were used to letter the car, after a coat of Future was applied to give a gloss finish. The decals were sealed with a coat of flat, and the car was weathered with acrylic paints, airbrushed onto the roof and underbody and applied as a wash to the sides which was wiped down with cotton tipped applicators in a vertical motion. Dry transfer chalk marks were applied in various locations to replicate those applied by yard and train crews to indicate routing and in route handling instructions.

While even the most ardent PRR modeler with several reefer trains won't need more than a handful of these cars, they make a fun and relatively easy detailing project and add a signature BRE car to your fleet.

Completed BREX refrigerator car.

Modeling PRR US&S Electro-Pneumatic Interlockings – Part 1

By Tim Garner

A typical installation at "ANTIS" interlocking near Altoona, Pa. in 1977. A 2" air line runs along the edge of the track bed. The A5 switch machines and CP valves are between the tracks. Branch pipes connect on the top of the main air line then dive under the tracks to the CP valves. In this image, it appears the compressor equipment is near the distant signal bridge. (David Oroszi)

"POW, POW…hissssss".

If you've spent time at almost any interlocking on the Pennsylvania Railroad multi-track mainline in the Northeast, I'll bet you've heard that sound – the sound of Union Switch & Signal electro-pneumatic switch machines changing the two switches of a crossover. You might occasionally hear the chugging of a compressor break the silence as it recharges the air line. Visually, the line-side details are unmistakable – the shape of the switch machine, the oval trash-can shaped valve housing, and hundreds of feet of aluminum-painted 2" iron pipe. I wanted those details for my layout, so I decided to learn more about them.

US&S Electro-Pneumatic Interlockings

George Westinghouse combined Union Electric Signal Company and Interlocking Switch & Signal Company to form Union Switch & Signal in 1881. The company opened a facility in Swissvale, Pa. along the PRR Pittsburgh Division mainline east of Pittsburgh. The PRR was an important customer for US&S and participated in live testing for many of the company's innovations. (The Swissvale plant closed in 1985.) The company became a subsidiary of Westinghouse Air Brake Company (WABCO) in 1917 – long an expert in pneumatic applications in railroading. In 1968, American Standard purchased WABCO and set up US&S as a separate division. Ansaldo purchased US&S from American Standard in 1988.

An interlocking is an arrangement of signals and track switches where multiple tracks intersect or cross. Signals let engine crews know the condition of the track ahead, their maximum speed (by rule), and whether their train will be moving from one track to another. Especially when coupled with track circuits for block occupancy detection, interlocking equipment prevents an operator (a railroad employee in a line-side tower or remote location) from setting up trains on conflicting routes, changing switches or signals without sufficient time for the train crews to safely respond, or even changing the position of switches under a train. Since one person can operate multiple switches and signals from one location, interlockings are more efficient than switchmen on the ground.

The earliest interlockings were mechanical. They relied on long levers in a tower connected by pipes and cranks to semaphore signals and track switches. Often called "Armstrong" machines because of the muscular force required to throw switches, many of these installations lasted well past the demise of steam engines often because railroads didn't feel the benefits of electric or electro-pneumatic equipment were worth the cost in some locations.

Armstrong interlockings had drawbacks. The operators had to be able-bodied. The maximum distance of switches and signals from the operator was limited by the weight of the piping and mechanical resistance to movement. Changes in temperature caused expansion or contraction in the piping and the moving parts needed regular maintenance and lubrication. Snow and ice could prevent the system from working.

Inventors sought to improve the system with power interlockings. Union Switch & Signal installed the first large scale power interlocking at East St. Louis in 1882. The switches and signals were operated by hydrostatic pressure controlled by compressed air.

In 1890, US&S installed the first electro-pneumatic interlocking on the PRR at its terminal in Jersey City. By 1914, 90% of the major passenger terminals with power interlockings used US&S electro-pneumatic equipment. That included virtually every major terminal on the PRR and interlockings on its highest density mainlines.

At an electro-pneumatic interlocking, an operator flips levers on a cabinet to change switches (the upper row of levers) and signals (the lower row of levers). The cabinet houses timers, rods, and switches that drive the safety features of the interlocking. Moving the levers sends a low voltage electric signal to an electrically-controlled valve on a switch machine or signal to admit air from a pressurized line. The air moves a piston that either changes the position of a track switch or a line side semaphore signal blade. Eventually, most railroads replaced air-operated semaphores with electric semaphore or lighted signals.

Logically, it would seem an electro-pneumatic system would be more complex and expensive than a purely electric system. So why would the PRR and other railroads choose it? A US&S promotional book published in 1914 states these advantages among others:

- *Safety* – The low voltage of the electrical circuits make the grounds, crosses, and short circuits that occasionally develop in electrical gear less destructive and dangerous than with a higher voltage all-electric system.
- *Reliability* – One example of reliability was the Long Island Railroad's Flatbush Avenue Terminal in Brooklyn, N.Y. It was installed with 85 signaling units handling an average of 352 scheduled trains and 65,000 passengers every 24 hours. In 1913, the number of switch and signal operations was 4,407,375 with seven errors – one in every 629,625.
- *Durability* – US&S indicated the equipment went long periods without material renewals – often as long as 30 years. When equipment was replaced, it was typically due to advances technology, not because of wear or failure. The operation of the pneumatic cylinders has a shock-absorbing quality that ensures long life to switch machines and signals. The operating pressure in the system is a range between 55 psi. and 75 psi. Higher pressures can be used if the pressures are reduced at the switch machine or signal.
- *Air pressure is unaffected by distance* – The ease with which a simple cylinder, piston, and valve can do the work is unaffected by distance. The current in electrical circuits is reduced by electrical resistance as it gets longer.
- *Low voltage* – The current used to operate each valve's electromagnets is very low (12 volts) and the contacts can be small.
- *Thinner wire* – Because the current required for valve magnets is small, wires of 16 gauge are sufficient. There is a negligible drop in electro-mechanical force between the electric generator and the valve magnets.
- *Space-efficient in the tower* – The nature of the equipment requires less space for the machine for a given number of levers. The operator can handle more levers without changing position resulting in faster handling of traffic.

Components of the System

From a modeler's perspective, there are a few key components of a typical PRR electro-pneumatic interlocking.

Another typical installation with concrete pipe foundations at "DF" Tower just east of Driftwood, Pa. in 1967. (Ken Belovarac)

In the Tower

Each installation has a large metal cabinet with a variety of high levers for switches and lower levels for signals. This would be installed on the second floor of the tower. An electric map called a "model board" is suspended from the ceiling or on the wall above the cabinet. It has white lines to represent the trackage controlled by the tower and lights to indicate the position of trains and switches. On the first floor of the tower could be found cabinets with relays and batteries to help the switches and signals operate. In many instances, you might also find electrical generators and air compressors that power the distant switch machines.

As the PRR sought efficiencies, it would close towers and consolidate control of multiple interlockings into fewer towers. It was common for a tower to have the older standard electro-pneumatic equipment for the interlocking for the tower's original area of control and a more modern Centralized Traffic Control (CTC) console to control the added territory. The original trackside equipment remained electro-pneumatic when CTC was used.

To model this tower equipment, I recommend reviewing Ron Hoess's *TKM* No. 39 on "AR" Tower.

Compressors and Air Tanks

Compressed air made the system work, but there was no specific standard for how it was to be supplied. PRR's *Specifications for Signal and Interlocking Systems* from 1957 indicated:

> *"Compressed air may be obtained from an available, continuous air supply system which supplies air for other railroad services. Where such supply is not available, automatically controlled motor driven compressor units of sufficient capacity shall be installed."*

In studying photographs of electro-pneumatic interlockings throughout the system, the four most common locations for the compressor equipment and air tanks (reservoirs) are:

- In the ground floor of interlocking towers – Air supply pipes extend through the front, back, or side wall of the tower. They eventually extend toward the tracks, turn, and extend parallel to the roadbed.
- In a tool shed adjacent to an interlocking tower (or remaining after the tower was razed) – Air supply pipes extend out of the front or back of the shed toward the track then turn and run parallel to the roadbed.
- In equipment boxes adjacent to towers – Air supply pipes connect from an equipment box containing the compressor to one or more air tanks. Pipes extend from the tanks toward the tracks then turn and extend parallel to the roadbed.
- In stand-alone equipment boxes – Air supply pipes may connect to one or more adjacent air tanks and then run along the roadbed. They may also be installed without tanks.

The compressors were to be located at the end or ends of a single main air line. Where air lines would extend in either direction, they were to be at the most convenient point.

The purpose of the tank was to circulate the air before it entered the main air lines. Condensation, common whenever air is compressed, would collect in the bottom of the tanks where it could be drained or blown off. Where the capacity of the compressor was greater than 10 cubic feet per minute, atmospheric aftercoolers were to be used. These units look somewhat like radiators and can be seen adjacent to interlocking towers at a few locations. Pipe bypasses were to be provided around the tank and aftercoolers.

This installation at "AR" Tower in Gallitzin, Pa. features are large air tank adjacent to the tower. (Philip Hastings)

Air Pipes

Most of the piping feeding air to the switch machines was 2" diameter NPS (Nominal Pipe Size) – black pipe above ground and galvanized below. It is impossible to find wire of an exact match in every case, but here are the commercially available sizes you would use for most piping in the system:

Pipe	N	HO	S	O
Main feed lines – 2" NPS (2.375" outside dia.)	0.015" dia. 27 gauge	0.025" dia. 22 gauge	0.035" dia. 19 gauge	0.050" dia. 16 gauge
Branch pipes – ¾" NPS (1.050" outside dia.)	0.00625" dia. 34 gauge	0.0125" dia. 28 gauge	0.015" dia. 26 gauge	0.020" dia. 24 gauge
Connection at switches and signals – ½" NPS (0.840" outside dia.)	0.005" dia. 36 gauge	0.010" dia. 30 gauge	0.0125" dia. 28 gauge	0.015" dia. 26 gauge

Tichy Train Group makes most of these sizes in phosphor bronze in lengths up to three feet.

The 2" main air line was to be installed above the ground on one side of the tracks. At terminals and large interlockings a main could be placed on each side of the tracks when approved by the Chief Engineer. The two pipes would be connected by 2" cross-connecting pipes at intervals of 400' or less. Cross connections were to be at least 30" below the bottom of the railroad ties.

Branch connections from the main air pipe were to be 2″ or ¾″ pipe connected at the top of the pipe with a "street L" and a horizontal nipple not less than 6″ long to compensate for movement in the main line from temperature changes. Connecting at the top of the line was to reduce the chances of condensation in the lines running into the switch machines. Not more than two "cylinders" were to operate off a ¾″ branch pipe. One branch connection for every switch machine was typical.

Pipe Valves and Fittings

Photos of several installations indicate there are several globe valves on the main air line where it leaves the compressor and a various locations along the air line where it may be necessary to isolate a section of the line for maintenance. PRR specifications indicate the handles for these valves, unless secured, should be removed and stored so they could only be used by authorized persons. Maintainers inconsistently followed this specification. Photos clearly show valves with the handles on the valve stem and other where the stem stands alone.

In HO-scale, I found Cal Scale Globe Valves (190-361) do an excellent job representing the gate valves in the system. Cutting the handle from these valves or simply soldering on a short vertical piece of wire to the main air line can represent a valve stem without the handle.

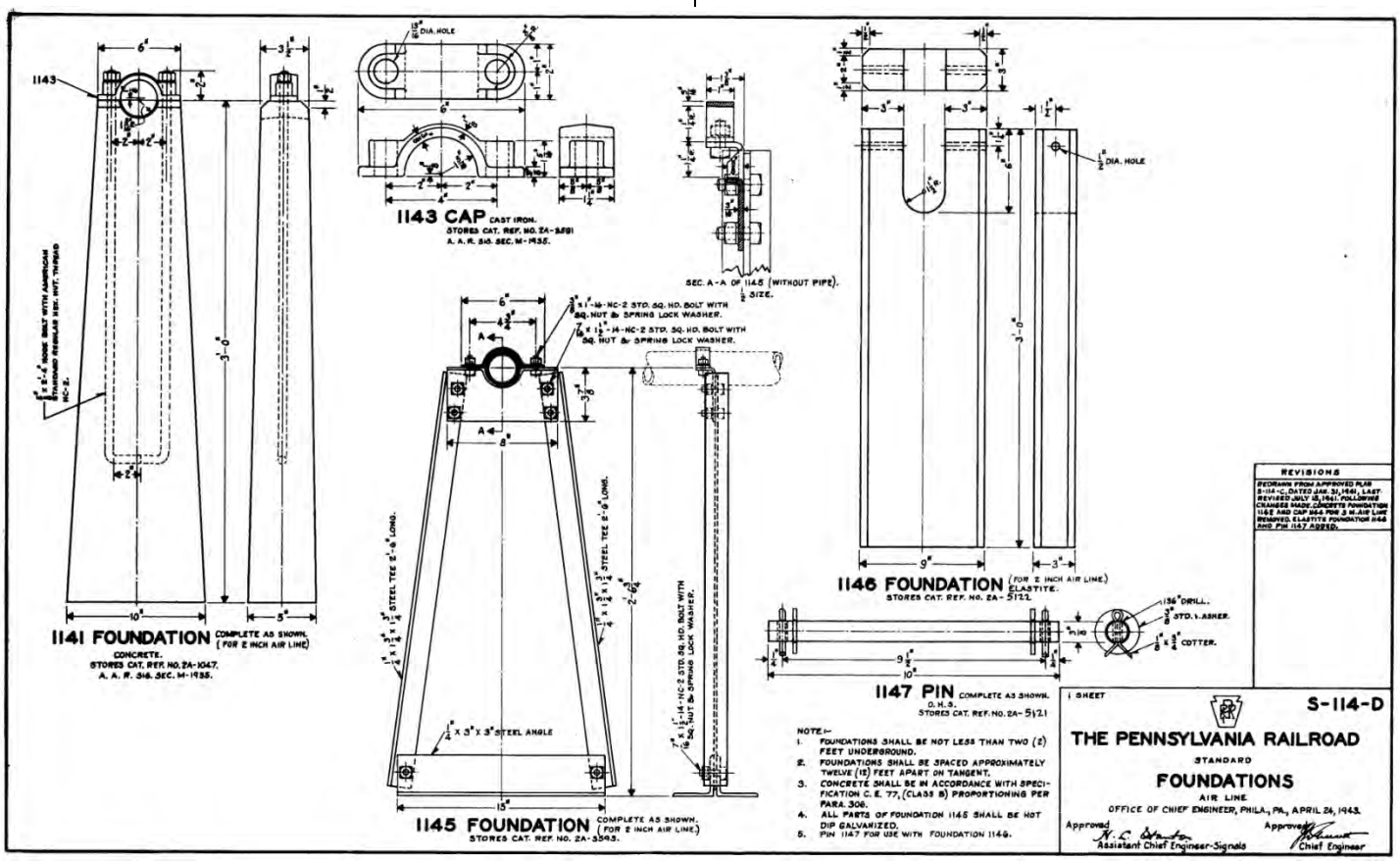
Pipe Supports

Drawing S-114-D, Standard Foundations Air Line dated April 24, 1943 shows three standard 3′ tall foundations. A minimum of 2′ of this height was to underground. However by the late 1940's, it appeared that more than 1′ extended above the ground in most installations – possibly due to settling of the soil. The supports were to be approximately 12′ apart on tangent track.

The most common in photographs is #1145. This is made primarily of two pieces of hot-dip galvanized steel T stock and three pieces of angle stock bolted together with a cast cap to hold the air pipe. It somewhat resembles a long staple. These foundations would be challenging to model to scale in quantity unless you made them in resin or etched brass. You can see Andy Rubbo has done so very convincingly on his PRR layout in *2013 Great Model Railroads* (Kalmbach Publishing ©2012).

Concrete foundation #1141 is 10″ x 5″ at the base tapering to 6″ x 3½″ at the top where a cast metal cap holds the air line in a notch.

The easiest to model is #1146. This is a concrete casting 9″ x 3″ x 36″. At the top is a U-shaped slot to support the pipe. A ⅜″ dia. x 10″ pin (#1147), held in place by two washers and two Cotter pins, extended through the legs of the U to secure the pipe. This can be convincingly modeled in HO with Evergreen 10″ x 4″ styrene strip and thin wire for the pin.



This standard foundations plan from 1945 shows three common main air line foundations. From photo evidence, #1145 made of metal shapes was most common. All are 3′ tall. At least 2′ was to be under ground, but after the soil settles, more was revealed. (Rob Shoenberg, prr.railfan.net)

► *These foundations are style #1145 and were most common. The concrete block with the metal "V" is a "pipe anchor". In some installations a second air line ran below the main line resting on a metal cross piece.*

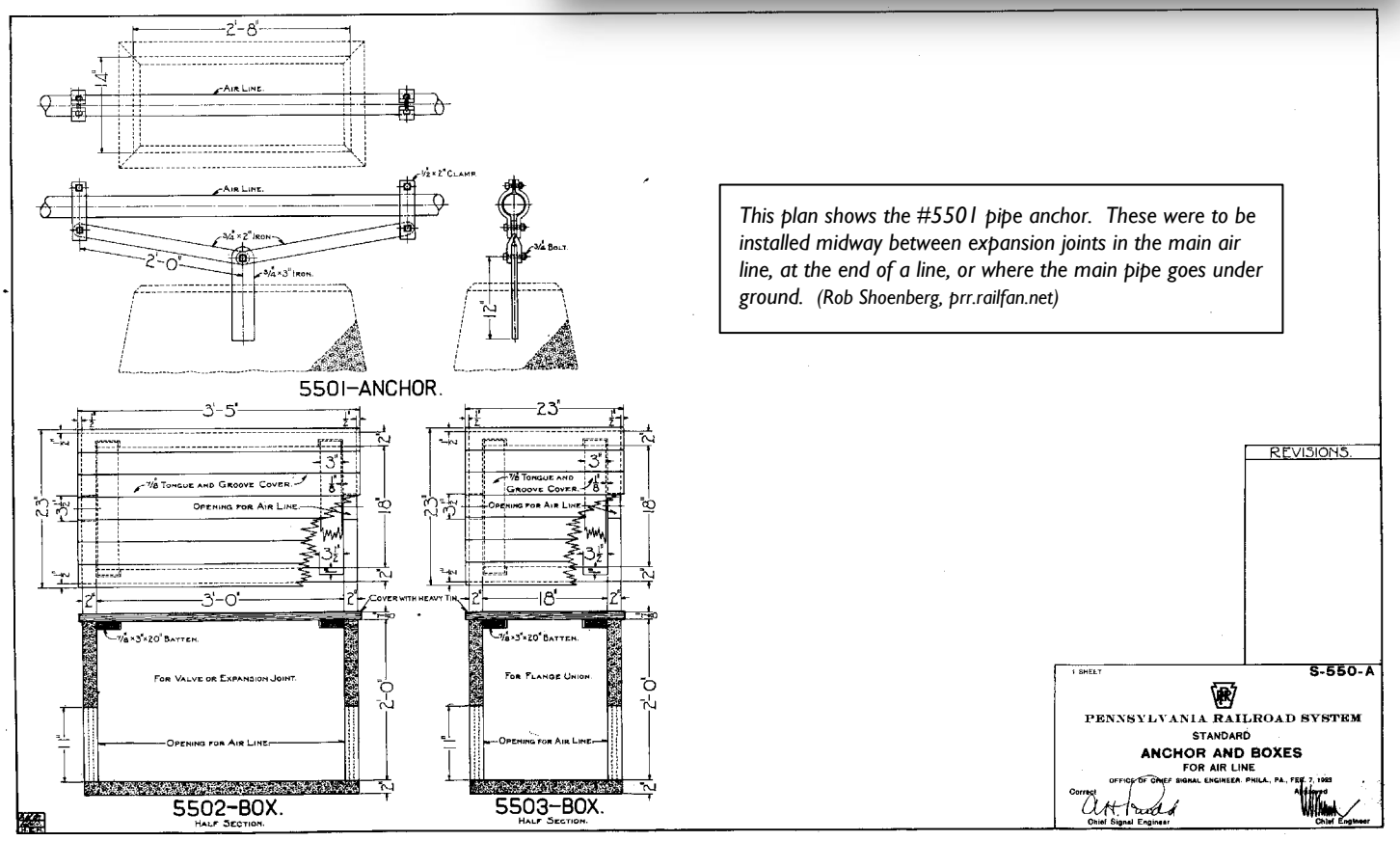
► *These concrete foundations are style #1141. Note they are tapered and have a cast metal cap to hold the main air line in place. (Terry Stuart)*

► *This is a variation of concrete foundation #1146. It has a U-shaped opening with a retainer bolt, but the foundation is tapered. The official drawing for #1146 shows straight sides.*

► *These foundations appear to be the oldest. They are concrete cast in an I-beam shape. They have a bolted-on cap that appears to be wood. The air line rests on top. This image is in Braddock, Pa. near US&S headquarters in Swissvale. These supports appear mostly on the Pittsburgh and occasionally on the Middle Divisions. (Cy Hosmer Collection)*

► *This image of a derailment near Lewistown around 1920 shows the older foundations supporting a conduit. Later, pipes would be removed from the conduit.*
(Robert L. Johnson collection)

► *The same air lines that fed switch machines fed pneumatic car retarders in major yards. This line in Enola includes a #5501 pipe anchor and #1145 foundations. Note the pipe and foundations are painted black. Note also that the branch pipes come out of the top of main air line before going into the ground. This was to prevent accumulated condensation from flowing toward switch machines.*
(John Dziobko Jr.)



This plan shows the #5501 pipe anchor. These were to be installed midway between expansion joints in the main air line, at the end of a line, or where the main pipe goes under ground. (Rob Shoenberg, prr.railfan.net)

Two other variations have appeared in photos that have not shown up in the plans so far. Both are cast concrete. The first appears to be the shape of #1146, but instead of the U-slot, there is a notch at the top to support the air line. Bolted over the pipe is a stamped steel strap. This would also be relatively simple to model.

The final variation seems to be the oldest from photo evidence. This more substantial support is cast in the shape of an I-beam with a flat end. The air line rests on top. An image of an interlocking near Lewistown suggests these supports originally supported a rectangular conduit containing the air lines. Later images show the air lines resting on what may be a wood block on top of each support.

Drawing S-550-A shows a drawing of a pipe anchor. These were to be installed midway between each pair of expansion joints, at the end of a line, and where main pipe lines go underground. These can be modeled with flat wire and a styrene base. Expansion joints were to be no more than 500 ' apart.

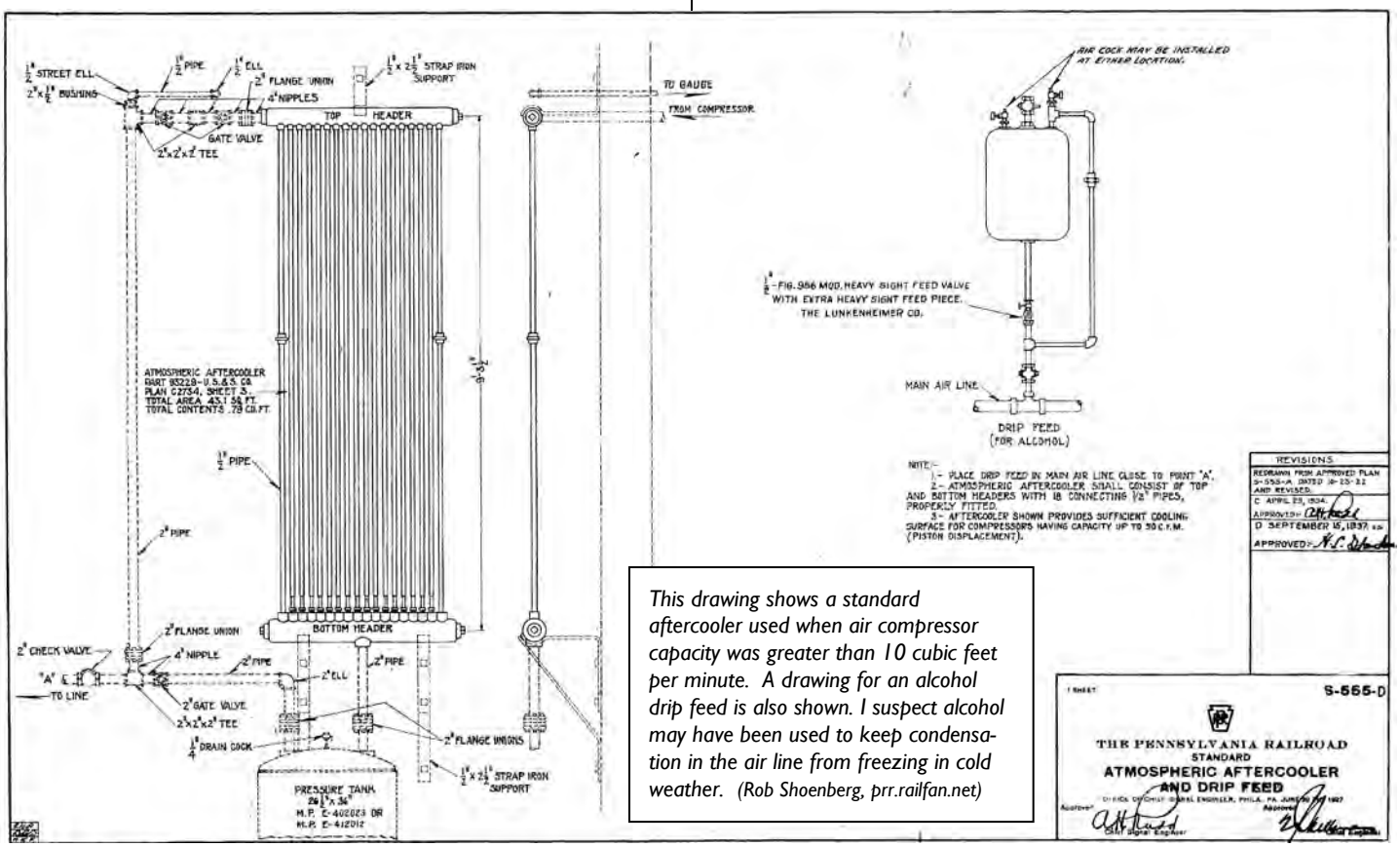
Switch Machines

Switch machines typically had two components – the machine itself and a CP valve housing. There is one air line to each end of the switch machine piston from the side of the CP valve. A flexible electrical conduit extends from a junction box on one end of the CP valve to the circuit controller on the switch machine. Branch air pipe connections to the valve are buried and not visible. On multiple track mainlines, a review of hundreds of photos indicates machines are typically mounted between the tracks and rarely on the shoulder of the roadbed.

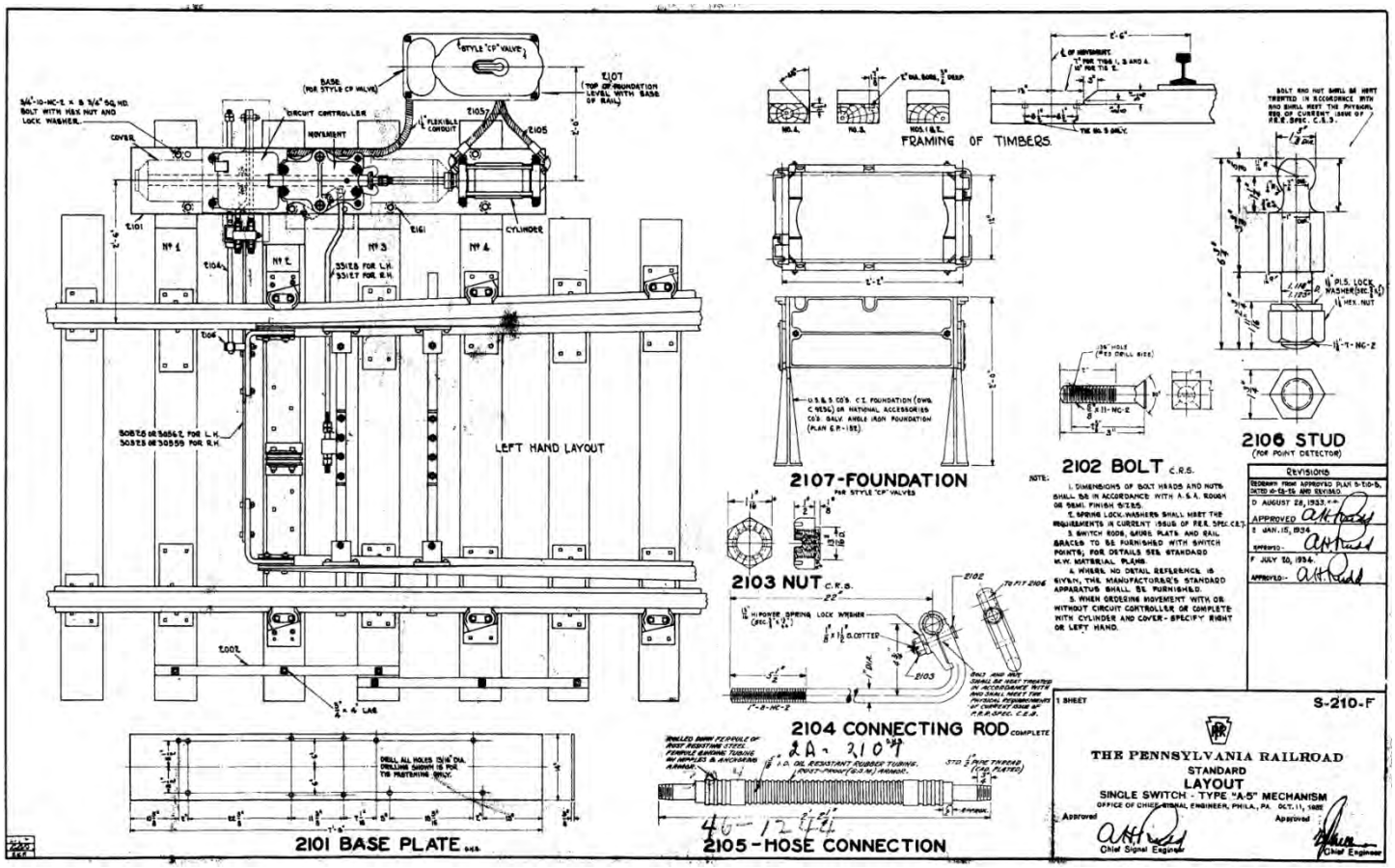
With most track switches, one machine is used. I have observed two on switches with long points such as the No. 20 turnouts found on the New York to Washington mainline. Each machine is supported by four longer cross ties. Where the machine rests, the surface of the tie is 8¼" below the rail-bearing surface. This is to facilitate the rodding extending below the stock rails to the points. The center line of the switch machine is 2'-6" from the inside edge of the closest stock rail. The centerline of the CP valve is 2'-0" from the centerline of the switch machine.

The machines were made in left, right, and center-pull designs. Based on the standard layout, the switch machine was always installed with the cylinder end closer to the switch frog. The CV valve rested on a partially buried metal foundation. The top of the foundation was to be even with the base of the rails.

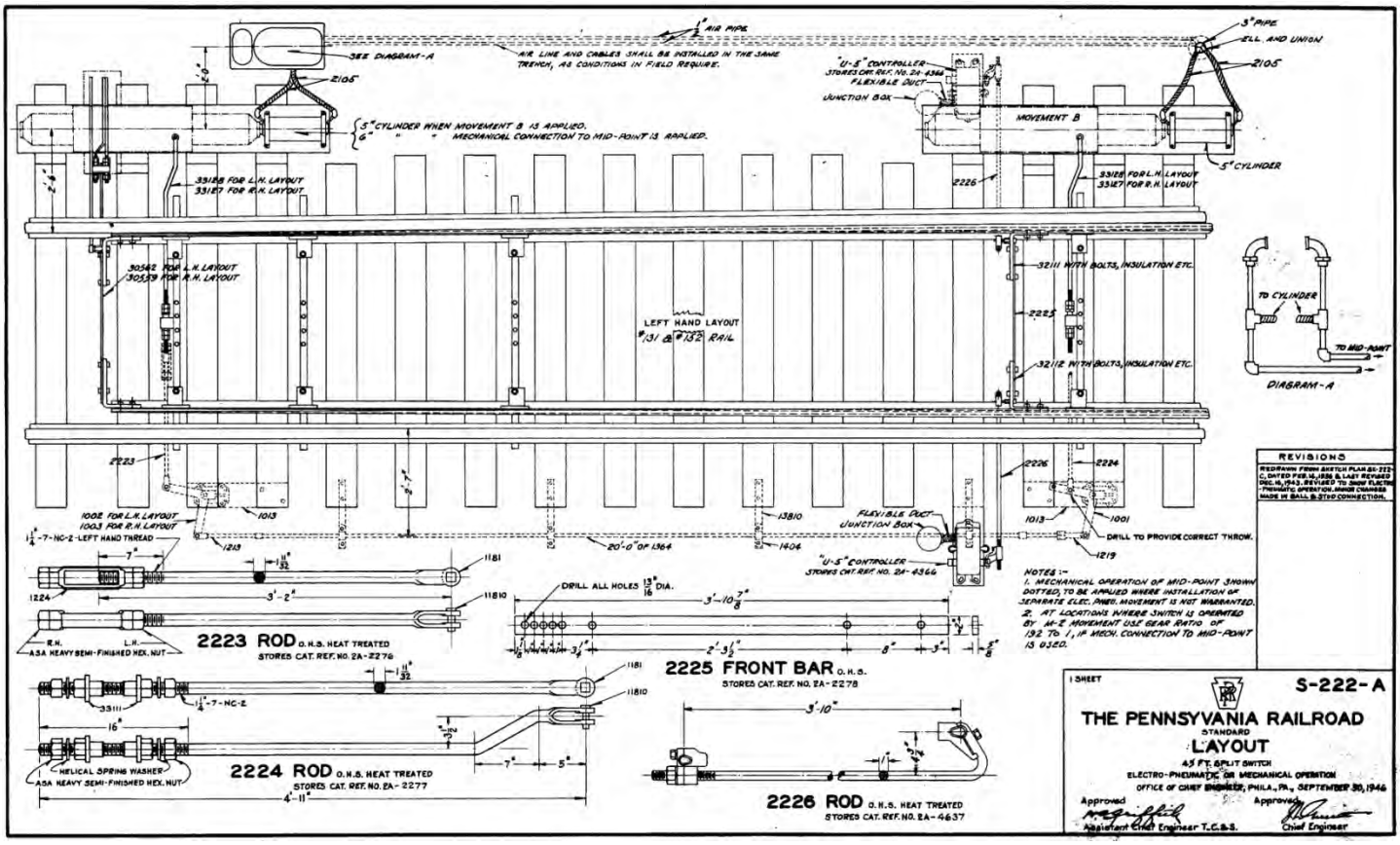
The Irish Tracklayer makes brass castings of the US&S A5 electro-pneumatic switch machine in HO, S, and O-scales. They are available in left, right, and center-pull and include the distinctive valve housing. They can be ordered through Amazon. At this point, N-scale machines would need to be scratchbuilt. Wires can be used to simulate the air and electrical connections between the value and the machine. Other connections to the valve were buried and would not be visible.



This drawing shows a standard aftercooler used when air compressor capacity was greater than 10 cubic feet per minute. A drawing for an alcohol drip feed is also shown. I suspect alcohol may have been used to keep condensation in the air line from freezing in cold weather. (Rob Shoenberg, prr.railfan.net)



▲ *This drawing shows how a US&S A5 switch machine and CP Valve were mounted on a switch. The drawing shows how far apart the components should be placed and the profile of ties that support the machine.* ▼*This drawing shows the mounting of two switch machines for switches with especially long points. Note one CP Valve controls both machines.* *(Both, Rob Shoenberg, prr.railfan.net)*



For my first project, I wanted to upgrade the detail on an existing two-crossover interlocking on my layout with US&S electro-pneumatic equipment. This location does not have an adjacent tower. I will cover one of those installations in a follow-up article.

My layout is essentially complete, so I would be installing the details along existing Atlas code 100 track with existing scenery. If I were completely rebuilding the interlocking, I would use better detailed commercial code 83 track. I would also want to create PRR-specific track details such as the cast steel guard rail and stock rail braces Andy Rubbo has modeled for his layout.

Preparing the Switch Machines

The Irish Tracklayer A5 brass castings are very clean. I did grind off the nub under the piston end to have more flexibility in mounting the machine. Next I drilled shallow holes in each end of the piston and one end of the circuit controller housing with a #78 drill bit. I drilled mating holes in the base of the CP valve on the track side. Next I shaped short lengths of 0.0125" dia. wire to represent the air and electrical hoses. I joined the switch machine and the CP vale with the wires secured with ACC.

I washed the assemblies (two rights and two lefts) with detergent then painted them with Floquil grimy black.

Preparing the Foundation and Mounting the Machine

The Atlas switches on my layout have lugs on the side originally designed to attach a surface-mount Atlas switch machine. I used several Xacto blades to carve these lugs down to better represent ties. Next, I removed ballast where the A5 would be mounted. From scale wooden ties, I cut four pieces to extend the four ties that would support the machine. I glued these in place with ACC then painted the ties Floquil Railroad Tie Brown. Once dry, I ballasted around these ties making sure not to get glue on the throw rod or points.

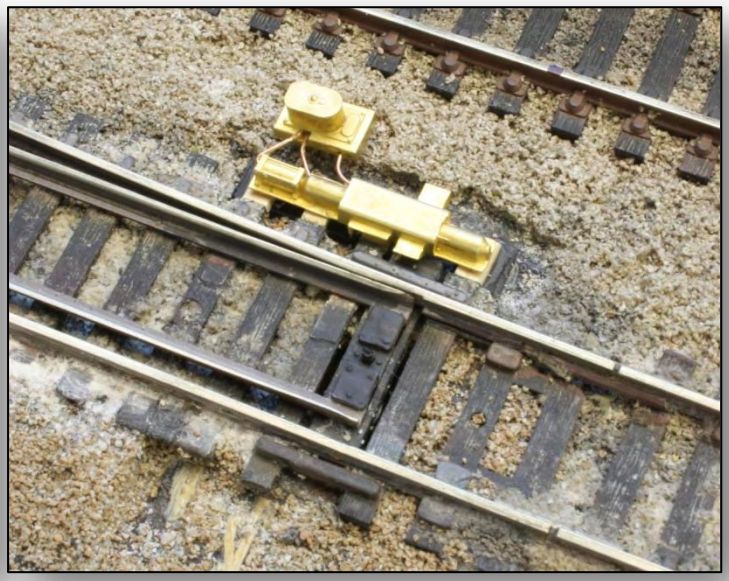
To dress up the switch, I added five rail braces from Details West on the outside of each stock rail with ACC. I also cemented Details West code 83 plastic joint bars on both sides of each rail every 39 scale feet. Finally, I cemented the switch machine/CP valve assembly in place. I repeated this for all four switches.

Making and Installing the Pipe Foundations

To determine how many foundations to make, I marked the center point of the foundations along a ruler every 12 scale feet for the length of the interlocking. Using an awl, I created a starter hole as a drill guide for each hole. Using electrical tape as a depth stop, I drilled 9/64" dia. hole a scale 1'-6" deep at every spot. A 1/8" dia. hole would yield a tighter fit but the bigger hole gave me some wiggle room I thought I might need to make the pipeline straight.

For my first installation, I chose the 1146 design as the easiest to model. I took strips of Evergreen HO-scale 4" x 10" strip and marked them every three scale feet. I marked the center of the curved U-shape on each length with a sharpened ice pick. I drilled out each of these with a #70 drill bit. I marked enough for the job plus extras to replace any I might damage or lose. These buggers are small!

Ties in place to support the A5 machine.



Test fitting the A5 machine and CP valve. (Both, Tim Garner)

Styrene #1146-style foundations glues in place along the roadbed with 0.025" dia. wire test-fit in the U-shaped openings. (Tim Garner)

Using a sharp #11 blade, I cut the strips into the marked 3' sections, and then opened up the U-shaped opening from the holes to the ends. The drawing shows this foundation has a beveled edge. I duplicated this by scraping the back of the #11 blade along all four long edges of each piece. The final and toughest part was to drill a #79 hole through both legs of the U for the 0.008" dia. wire retainer pin. They would be installed after the pipe was resting in the foundations.

Next, I inserted a foundation in each hole secured with a drop of white glue. I found most of them were drying straight and I adjusted the others as they set. Once firm, I lightly brushed them with an old concrete color. After the paint dried, I filled in around the holes with ballast or foam foliage as appropriate.

Building the Compressor Assembly

This was the most challenging, but most satisfying part of the project. I used the photos I took in the late 1970's of a unit at "BENNY" Interlocking at Bennington, Pa. as the pattern. It is likely this unit was a witness to the famous "Red Arrow" train wreck at this location.

I started by making the compressor cabinet which is very similar to any signal box. I used 0.010" thick styrene sheet for the frame and doors and 0.020" thick sheet for the top. First I cut out the outer pieces of the sides, base, and roof (see the drawing for size). Then I cut narrower strips to attach to the inside of those pieces. This would give the frame box a little more strength and provide a glue surface for the doors.

After assembling the frame, I added the doors and cut strips from 0.005" thick sheet to represent the hinges and latch. I decided not to attempt to add the louvers. I couldn't think of a convincing way to neatly model them to small, so I skipped them. Finally, I added a piece of 0.010" to the base to represent the corner brackets where the cabinet is bolted to the foundation. I cemented Tichy nut/bolt castings at the corners.

Next came the concrete base made from layers of 0.080" thick styrene sheet. After gluing the layers together, I sanded them smooth with 200 grit sandpaper and slightly beveled the edges with the back of an Xacto #11 blade. I cemented the cabinet to the base.

The air tank is strikingly similar to the propane tanks many people use with their gas grills. To make it, I cut a section of styrene tubing and cemented pieces of 0.030" thick styrene to the ends. Once dry, I used a jeweler's file to round the top and bottom of the tank to match the profile in the photos. I cut a smaller piece of tubing to form the round part of the base. I added two Tichy bolt/nut castings on the side of the tank to represent drain plugs. I used some 0.010" styrene to form the flat part of the base. I carved it to shape after cementing it in place, then added bolt/nut castings to attach it to the base.

I made the concrete foundation for the tank from layers of 0.080" styrene. When dry, I sanded it smooth, beveled the edges, and cut a slot in the top that opens to the back. I suspect this opening was for access to a drain plug on the bottom of the tank.

With the tank and the cabinet in place, it was time to start on the piping. I used 0.025" dia. wire for the main lines and smaller sizes for the other connections. I test fitted Cal-Scale globe valves (#190-361) on the wire and drilled out any that needed it before starting. I cut and bent the wire shapes. Wherever two wires came together, I brushed on some paste flux and tinned the end with rosin-core solder and a soldering iron. I used a piece of wood as soldering platform when joining pieces so I could more easily clamp them in position.

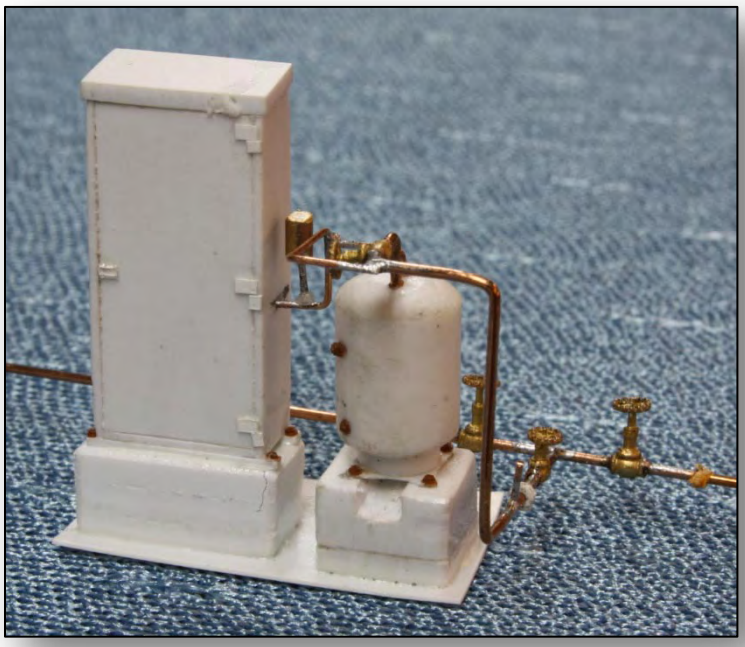
I'm not sure, but I think the smaller cylindrical object on the line leaving the compressor cabinet is either a pressure relief valve or the alcohol drip feed. I made this from a short piece of wire and a short piece of 1/16" dia. brass tubing soldered together.

To hold everything in position, I cemented the assembly to a piece of styrene sheet. Once set, I painted the metal portions aluminum and the foundations in concrete with some weathering.

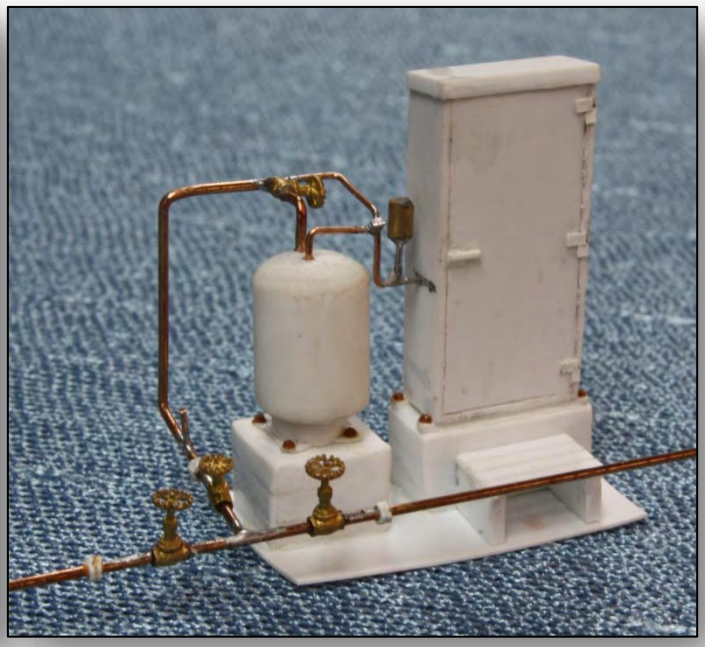
These images show the track side and the back side of a compressor/tank set at "BENNY" Interlocking in Bennington, Pa. in the late 1970s. This is what I used as the pattern for my model. I've also seen photos of similar set ups in other non-tower locations. Some approximate dimensions to point out in this installation based on scaling the photo:

1. *The air tank appears to be 24" in diameter and 30" tall.*
2. *The largest pipes are 2" NPS.*
3. *The compressor cabinet scales to 72" tall x 36" wide x 18" deep. The door is 32" wide.*
4. *The concrete bases are approximately 18" tall.*

Note the position of all the globe valves, the bolt attachments to the foundations for the tank and compressor cabinet, and the cut-out in the foundation of the tank for draining condensation. (Both Tim Garner)

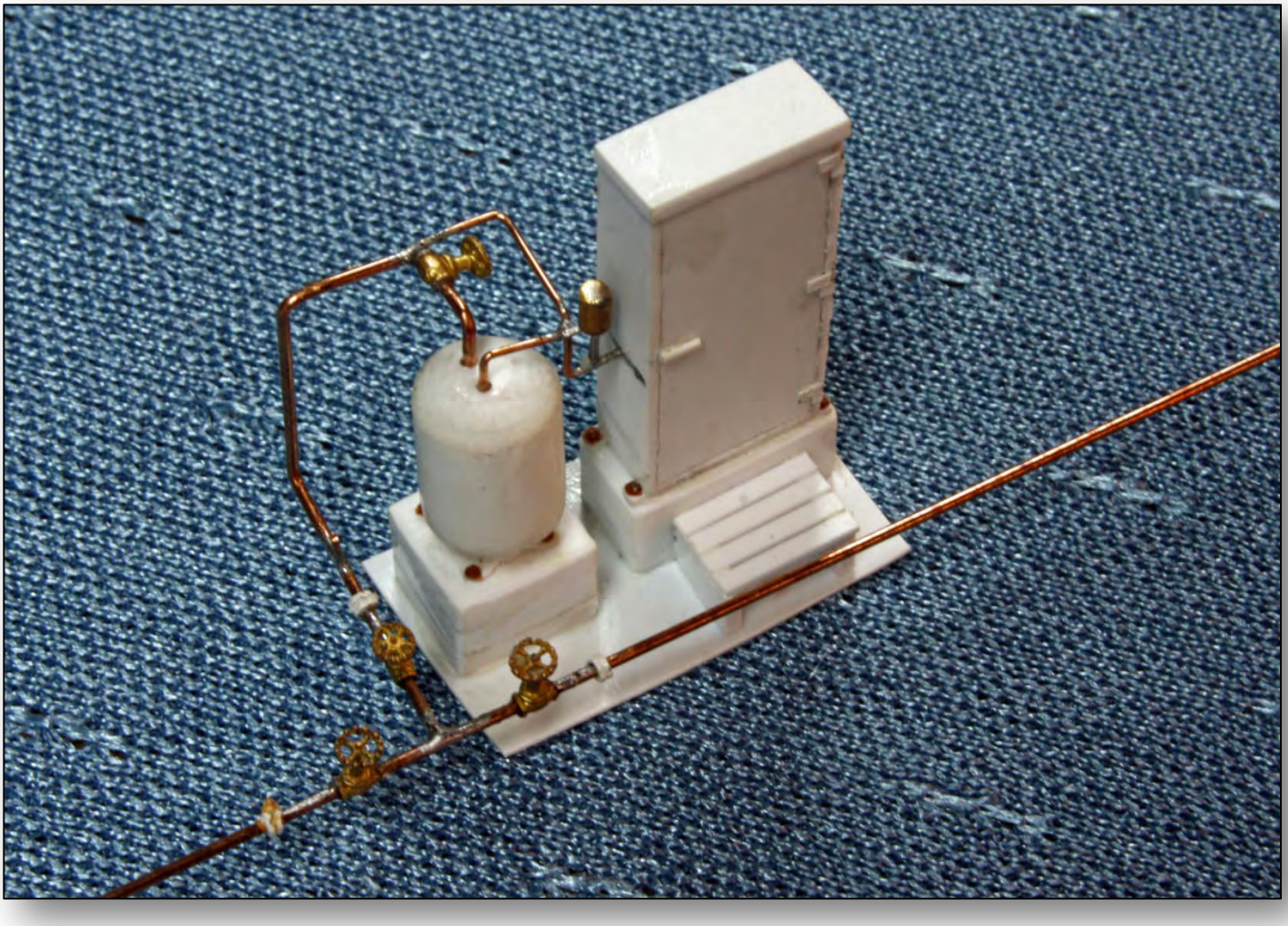


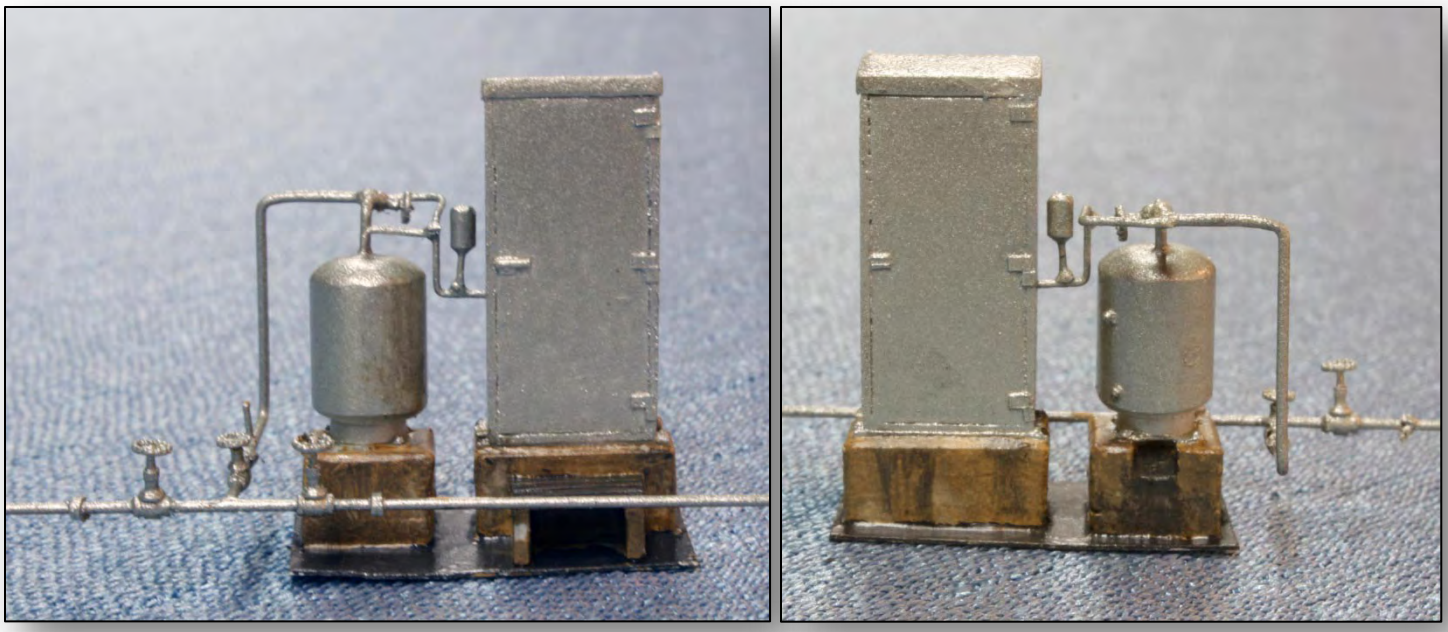
▲ *The back side of the completed compressor/tank assembly.*



▲ *Track side of the completed compressor/tank assembly. Note the position of the globe valves and bolt/nut castings.*

▼ *A more vertical view to show the piping.* *(Three photos, Tim Garner)*





Both sides of the compressor assembly after painting and weathering. (Tim Garner)

The compressor installed on the layout with an A5 switch machine in the distance. Note the joint bars on the rails. They come from Details West. (Tim Garner)

Putting it All Together

I test fit the compressor in position on the layout, then drilled a hole for any additional pipe foundations required. I soldered a length of 0.025" dia. wire to the end of the main air lines coming out of the compressor then placed the wire in all the pipe foundations. At each location where a branch line would leave to feed a switch machine, I drilled a hole in the layout and tinned the line with solder. Using 0.0125" wire, I bent a branch line, tinned one end, and then soldered it to the main air line.

After this was done, I removed the air lines and painted them aluminum. Once dry, I put the assembly back in the foundations and glued down the compressor/tank assembly. With needle nose pliers, I fed 0.008" wire through the pipe foundations over the main air line, secured it with a dab of ACC, and then clipped it close to the edges of the foundation. I finished off the assembly by gluing ballast and grass around the compressor/tank assembly.

Of all the detail tweaks I've added to my layout, I think this one says PRR the most.

Look for another installation at a passenger terminal in a future issue of *TKM*.

SOURCES:

"Specifications for Signal and Interlocking Systems – C.E. 234-(b)," Pennsylvania Railroad, 1957, from Rob Schoenberg's web site: http://prr.railfan.net/.

"PRR Standard Signal Plans," Pennsylvania Railroad, from Rob Schoenberg's web site: http://prr.railfan.net/.

Electro-Pneumatic Interlocking. Union Switch & Signal Company, Swissvale, Pa., November 1914.

Christopher Baer. The Pennsy in the 1950s. PRRT&HS, 2006.

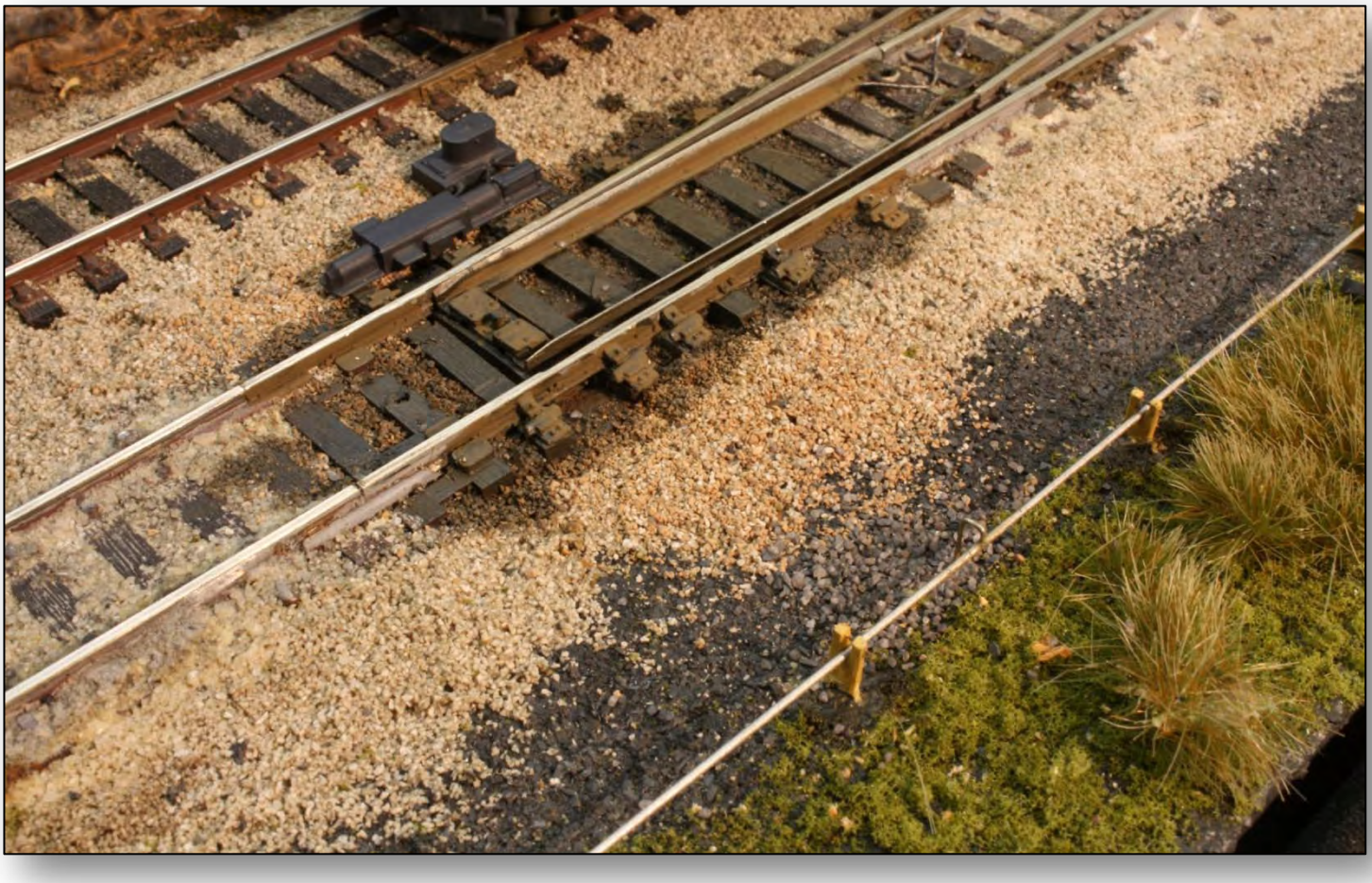
Christopher Baer. The Pennsy in the 1960s. PRRT&HS, 2008.

Ken Kobus and Jack Consoli. The Pennsy in the Steel City. PRRT&HS, 1996.

Ken Kobus and Jack Consoli. The Pennsylvania Railroad's Golden Triangle. PRRT&HS, 1998.

Betty Wagner Loeb. Altoona and the Pennsylvania Railroad. PRRT&HS, 1999.

Lewistown and the Pennsylvania Railroad. PRRT&HS, 2000.



This image shows the A5 machine, the main air line, and a branch pipe heading into the ground to reach the machine. (Tim Garner)

▲ *Right and left A5 machines. The air line has branch pipes to serve both and a globe valve to isolate half the line if necessary.* ▼ *A J1A moves through the re-detailed interlocking. (Tim Garner)*


9715
5828