

No. 144, March/April 2016

\$5.95



STEAM^{IN}THE GARDEN

IEEE 3

A walk-through (and review) of building the latest Aster Hobby 1:32-scale kit – Union Pacific's 4-8-4



- 'Dortlebug,' a 'Dora'-based steam rail bus
- Readers show their scenicked live-steam layouts
- Marc Horowitz resurrects an 85-year-old live steamer
- Bill Allen builds an Algerian streamlined Garratt, Part I

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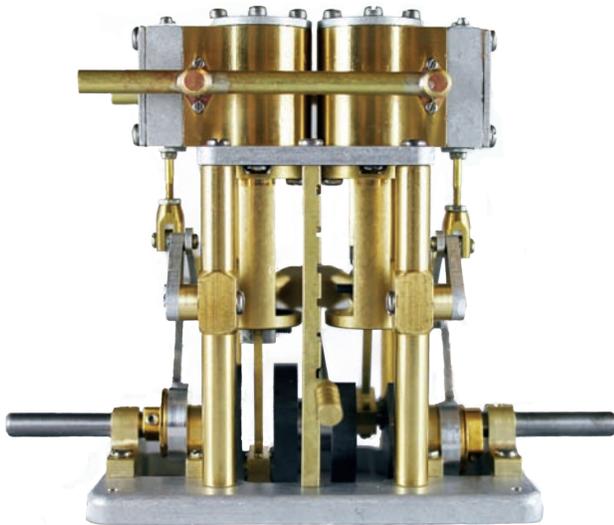


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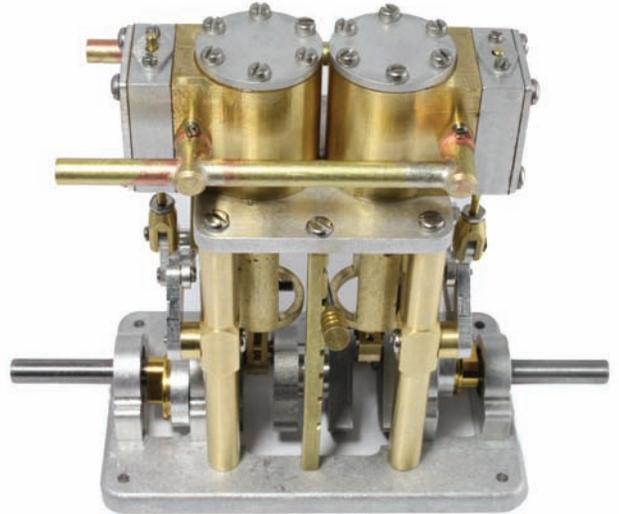
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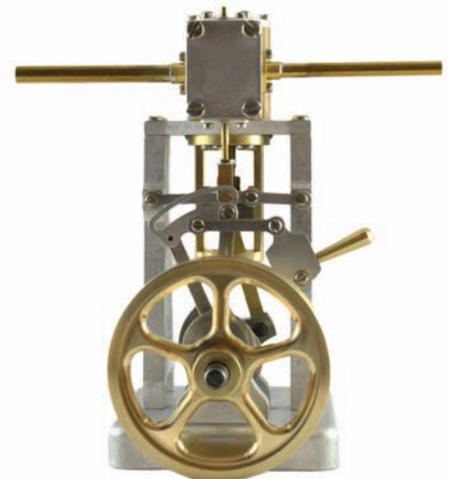
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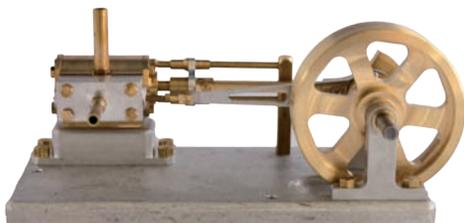


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The Class 64 was developed from 1926 onward and was built between 1928 and 1940. Many German manufacturers contributed to the series. In 1968 there were still 60

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(45mm), butane fired with a ceramic burner, bypass valve, Walschaerts valve gear, hand pump, axle pump, working whistle. Limited to 50 sets worldwide.



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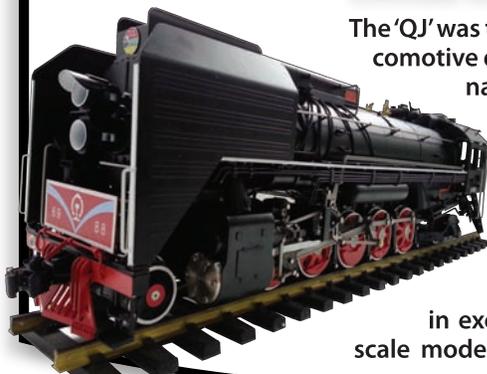


China's 'Big Boy' — steam model 'QianJin'

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The 'QJ' was the first high-powered locomotive designed and built in China. Engines were built between 1956 and 1988, with the last locomotive running in China in 2005. Five of the 2-10-2 engines were sold to U.S. railroads and three are still used in excursions today. The 1:32-scale model will come in both gas-

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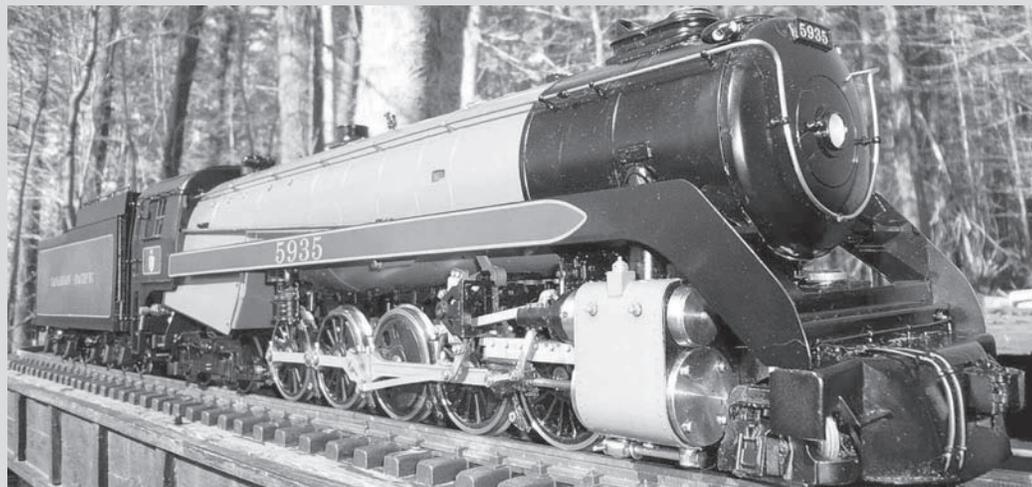
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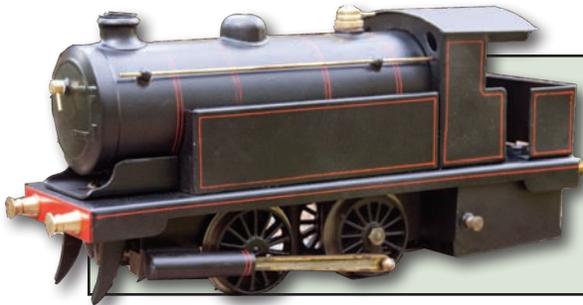


STEAM IN THE GARDEN

*Gather friends, while we inquire,
into trains, propelled by fire ...*

11

Latest waybill: Railroad hobbyists Tom Flair and Bruce Bates passed away in December. The Train Department's ball-bearing kits.



Resurrection.

An 85-year-old live steamer is brought back to life. By Marc Horovitz.

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FEF-3. A locomotive review and workshop project on building Aster 1:32-scale kit. By Charles & Ryan Bednarik.



'Dordlebug.' Making a steam rail bus out of a 'Dora' and a plastic rail car. By Peter Thornton.

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Streamlined Garratt. Building a 1:32-scale engine from Algerian/French prototype. Part I of three. By Bill Allen.



Steam in the scenery. Readers give opinions on scenicking live-steam rail layouts.

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Cover. A live-steam 1:32-scale model of Union Pacific's No. 837 built from an Aster Hobby Co. Inc. kit. By Ryan and Charles Bednarik.

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POSTMASTER: Send Form 3579 to *Steam in the Garden*, P.O. Box 335, Newark Valley, N.Y. 13811-0335.

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Subscriptions for the United States, Canada or overseas should be mailed to *Steam in the Garden*, P.O. Box 335, Newark Valley, N.Y. 13811-0335. Phone, fax and e-mail subscriptions are gladly accepted and we take VISA, Discover and MasterCard. PayPal payments are also available. Phone: (607) 642-8119; fax: (253) 323-2125.

Hobby retailers: Contact Kalmbach Publishing Co. at (800) 588-1544, ext. 818, if you wish to stock *Steam in the Garden* in your store.

Steam in the Garden LLC A Utah corporation

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Los Angeles, Calif. 90064-4330 USA

Circulation: P.O. Box 335
Newark Valley, N.Y. 13811-0335.

Steam in the Garden (USPS 011-885, ISSN 1078-859X) is published bimonthly for \$35 (Canada: \$US42;

Overseas: \$US72) per year (six issues) by *Steam in the Garden* LLC, P.O. Box 335, Newark Valley, N.Y. 13811-0335. New subscriptions, please allow six-eight weeks for delivery. Periodical postage paid at Newark Valley, N.Y., and additional mailing offices. Printed in the U.S.A.



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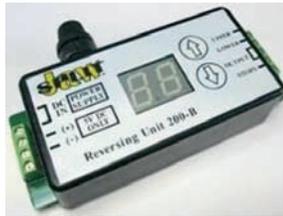
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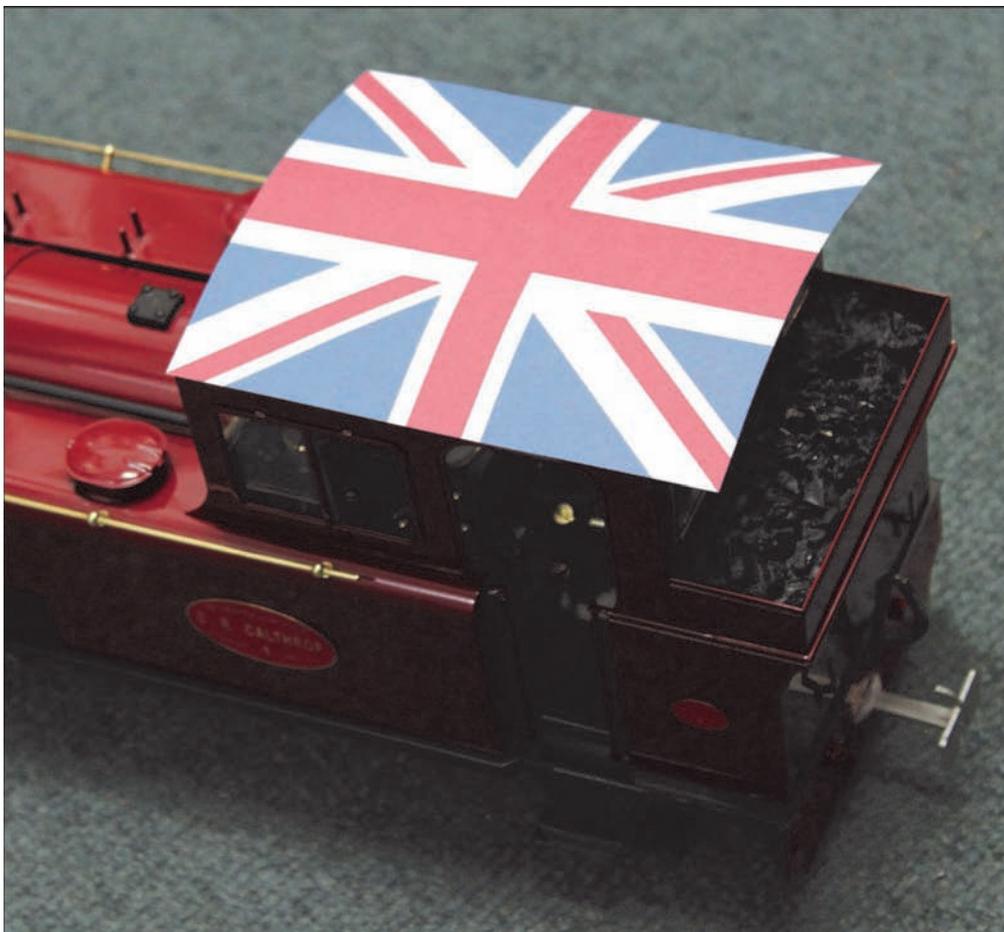


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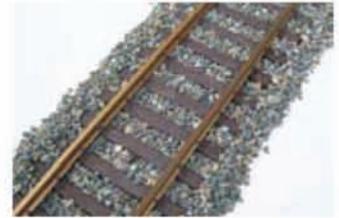
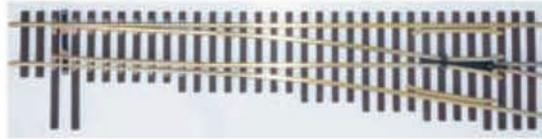
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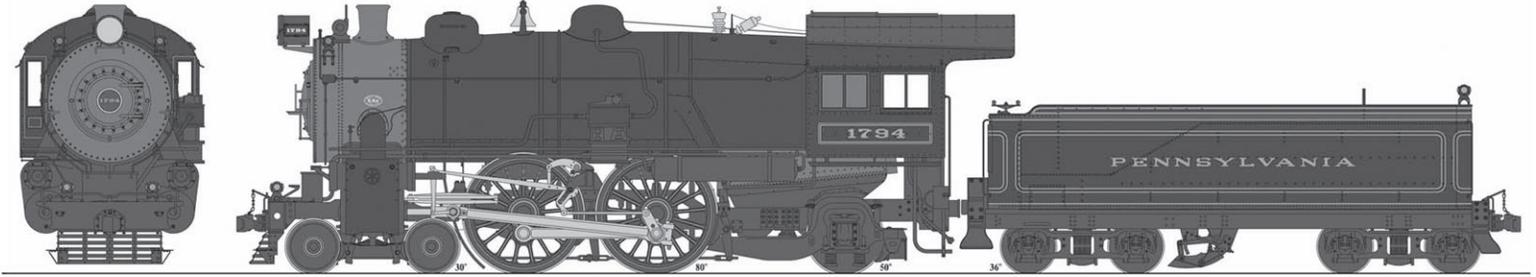
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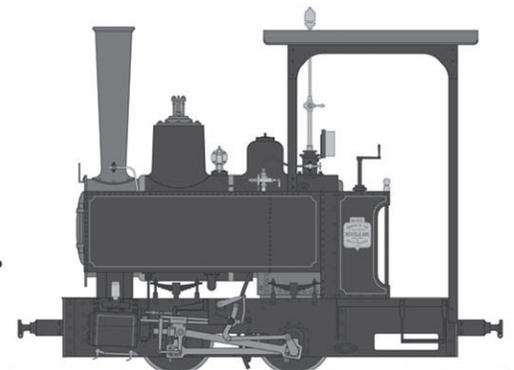
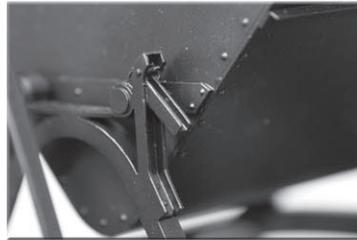
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LATEST WAYBILL

In memoriam: Tom Flair, Bruce Bates

Gauge One and small-scale live steam railroaders lost two friends last fall, as Tom Flair of New Orleans and Bruce Bates of Hendersonville, N.C., both passed away.

Flair had the unique distinction of having attended every International Steamup at Diamondhead, Miss., from its founding in 1993 to last year's event in 2015.

A native of New Orleans, Flair was an educator by trade with a 35-year career, first with the Orleans Parish Public School System and later with Delgado Community College, which serves the New Orleans metropolitan area. Flair was a teacher and principal in New Orleans high schools and professor, assistant dean and campus dean with the community college.

Flair took his bachelor's and master's degrees at Loyola University in New Orleans and his doctor of education degree at the University of Southern Mississippi in Hattiesburg.

In addition to small-scale live steam, Flair's interests included hunting, fishing and "all things Ger-



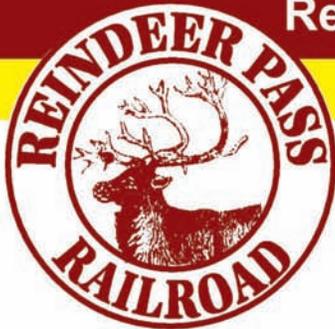
Tom Flair, 1941-2015.

Photo by Rick Parker.

man," his family said. An accomplished trombonist, Flair played in German bands and was well known for "his lively renditions of the German-language 'Schnitzelbank Song' and chicken dance at local festivals," according to the family.

Thomas V. Flair died Nov. 18 in Covington, La., at age 74. He's survived by his wife of 47 years, Ora

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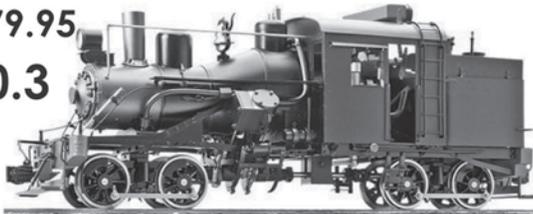
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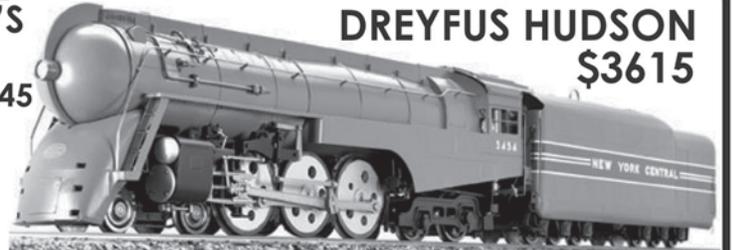


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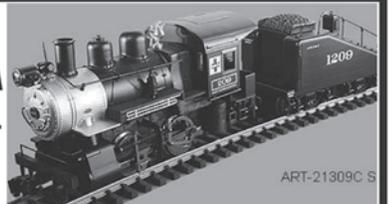
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Flair, a son and daughter and four grandchildren. He was preceded in death by a second son.

Bates, who died Dec. 2, was also unique: he filled the tiny niche of garden-railroading cartoonist. Bates' humorous drawings of trains — mostly imagined — ran in *Garden Railways* magazine from 1986-2001.

"View from the Birdwater & Raspberry," showed Bates' iconoclastic impressions of railroads in general and model railroading in particular. A 1995 illustration was a typical locomotive engineering drawing showing a properly proportioned, English-looking engine and tender. The humor in the drawing was that it was a 2-2-2 locomotive followed by a six-wheeled car. The engine had a pencil-thin boiler. Bates captioned it, "'Nevel,' of the Narnian Light Railway."

All of the Birdwater & Raspberry cartoons are archived at <http://www.bates-r-us.org>.

Ball bearing kits available

Kits to convert the wheels of Accucraft rolling stock to ball bearings are now available from The Train Department, the Hazlet, N.J., supplier of small-scale live steam products.

The kits are for a variety of 1:20.3-scale Accucraft products, including the gondola, flat, wheel and tie, stock, reefer, boxcar, short caboose, Jackson & Sharp coach and combine and the brass San Juan coaches.

The kits include the axle, wheels, bearings and spacers and are listed at \$30 each, not including shipping.

The Train Department is on the web at <http://www.thetraindepartment.com> or by phone at (732) 770-9625.

On his profile on the business web site [Linkedin.com](http://www.linkedin.com), Bates called himself a "botanical microferroequinologist," which translates roughly to a specialist in "small iron horses for gardens."

But Bates was not just a railway cartoonist, he was also a builder of great skill. Some of his more iconic Raspberry & Birdwater drawings ultimately became actual models that Bates built himself.

A co-founder of the AWNUTS garden railroad group — the letters stood for "Always Whimsical Not Usually to Scale" — Bates was a contributing editor to *AWNUTS Magazine* over the seven years it was published in the 1990s. The movement sputtered out but there continues a Yahoo message group and a web site at <http://whymysical.com>.

Born in 1949 in McPherson, Kansas, Bruce K.

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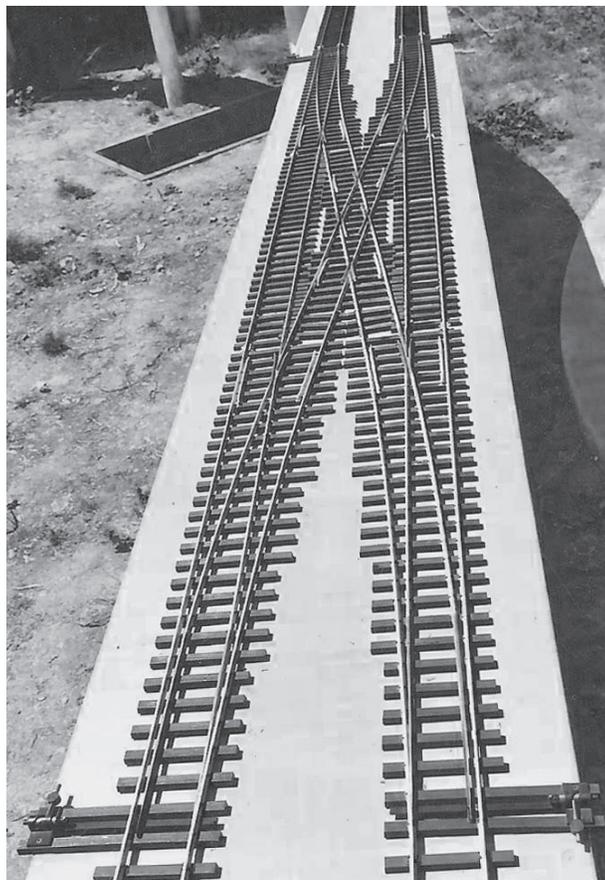
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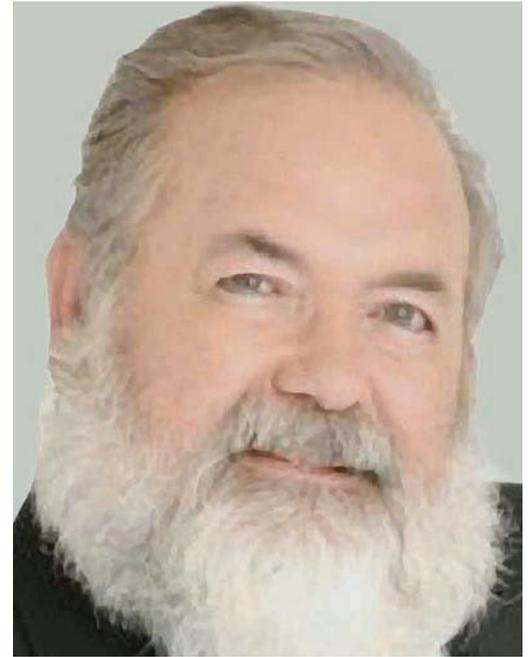
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Bates attended a local two-year college after graduating from high school in 1967. As was typical for young men of the era, once Bates completed college, his draft board indicated an interest in his service and he enlisted in the U.S. Navy. Serving 7½ years during the height of the Vietnam War, Bates was a crewman on the P-3 Orion anti-submarine and anti-surface warfare aircraft. Following almost five years flying, Bates spent almost three more as an air crew instructor and instructional material developer.

Over 31 years, Bates was in semiconductor layout and design; he worked for familiar names such as Teledyne, Agilent, Bosch, Texas Instruments and Qualcomm. His career took him from Silicon Valley to Colorado Springs, Colo., to North Carolina, where he telecommuted as a contract designer. He retired in 2014.

When he lived in Santa Clara, Calif., in the 1980s, Bates was a member of the Bay Area Garden Railway Society, and since his move to North Carolina, he'd been a member of the Apple Valley Model Railway Club. He was also a contributor to the site <http://www.7-8ths.info>, where discussions of 1:13.7-scale modeling are hosted.

Bates was married twice; first to Kathy and since 2002, to Gail Pollard Bates. With Kathy, Bates had two children, who in turn provided him with one



*Bruce
Bates,
1949-2015.
Photo
courtesy
LinkedIn.
com.*

grandchild. He is survived by all, as well as a sister.

Marc Horovitz, the longtime editor of *Garden Railways*, posted an obituary on the magazine's web site, which wrapped up by saying that Bates "will be sadly missed, not only by his family and many friends, but by all of those whom he had touched throughout his life with his creativity and humor."

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85-year-old Bowman No. 265 steamer brought back to life

Resurrection

Text, illustrations and photos by Marc Horovitz



Restored: Finished Bowman 0-4-0T on the author's railroad.

For years I had a decrepit old Bowman No. 265 tank engine sitting on a shelf, a gift from Dave Pinniger. This poor specimen, probably around 85 years old, had seen hard use and lots of it. It had been repainted at least once, perhaps many times. There was no visible vestige of its original color. However, the engine appeared complete, with the exception of one buffer, the boiler overflow plug on the front of the smoke box, and the safety valve. Some pieces were corroded, some sheet metal bent, and everything was caked with old paint, grime, dirt, oil, dust, and who knows what else.

I stripped the thing down (**Photo 1**) to see what I had. Bowman's locomotives are marvels of simplicity. They come apart easily and there are no superfluous pieces. With the boiler, cab, and miscellaneous above-deck bits stripped off, the chassis remained. The wheels turned smoothly and the felt pads built

into the pistons were, surprisingly, intact. I gave the chassis a good lube and put the air to it. It ran like a top (**Photo 2**). There's little to go wrong with Bowman engines — they don't even reverse.

With the running gear proven, I decided the next job was to straighten some sheet metal. Only two parts required this — the cab and the connector between the side tanks. The side-tanks connector was simple, entailing just some careful squeezes in the vise, with a little help from a pair of pliers. The cab, though a little more difficult, was similarly treated. The cab is made of heavy tinplate, and bending it back into shape

went smoothly. (Compare **Photos 3a and 3b**.)

I decided to tackle the flame guard next. This piece was almost completely corroded and I deemed it a total loss (**Photo 4**). It appeared to be made of steel, approximately 0.016-inches thick. I had some tinplate around the same thickness, so chose to use that for the replacement. I first traced the flame guard's folded form onto a piece of paper (**Photo 5**) so I'd have some idea of what shape to make the new one. I then flattened the guard in the vise and traced its outline onto another sheet (**Photo 6**), along with the fold lines.

After spraying the back of the pattern sheet with adhesive, I stuck it to the tinplate and trimmed the metal to the outside dimensions using my shear. The interior cutout I did with a rotary tool (Dremel) and a large cutting disc, finishing up with a file. I transferred the fold lines from the paper to the metal with a hobby knife (**Photo 7**). After folding the



Photo 1



Photo 2



Photo 3a



Photo 3b



Photo 4

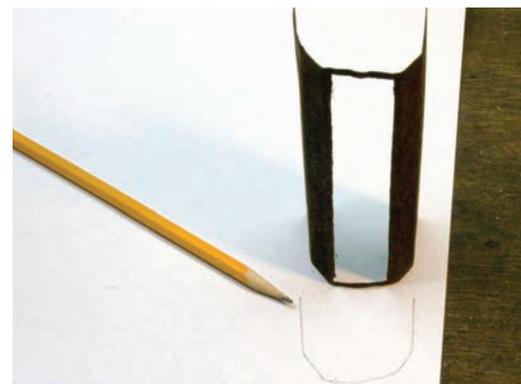


Photo 5

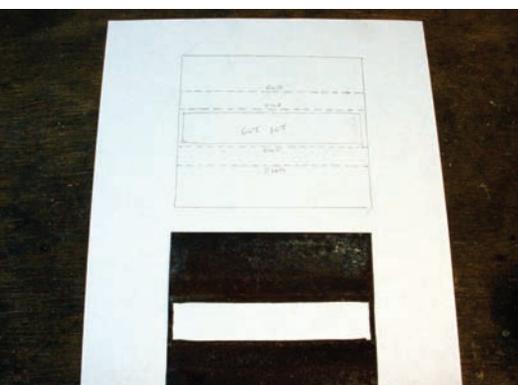


Photo 6

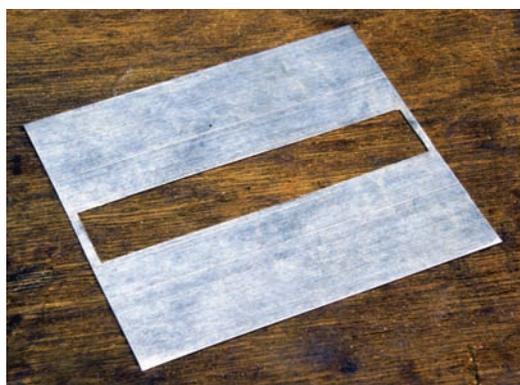


Photo 7



Photo 8

flame guard to shape on my brake, the finished item looked like **Photo 8**.

The next thing to be done was to get all of the parts down to bare metal, or as close to it as I could. This was a project to which I was not looking forward! I didn't want to do it mechanically (grinders, sanders, et al) for fear of damaging the metal, and I don't have a sandblaster. That left chemical means. I opted for Klean Strip. I reduced everything to its basic elements, including the burner (**Photo 9**) and the chassis (**Photo 10**), then gave everything a good scrub with a brass wire brush.

Paint stripping, even with an aggressive product, is a horrible, awful, messy business. This project took three rounds for most of the parts and, even then, I didn't hit bedrock on all of them. The original paint, probably some kind of stove enamel, was amazingly sturdy stuff. I decided I didn't really need to get all the way down to bare metal on all of the

parts — I just needed a good, smooth surface for the new finish.

The job was eventually finished (**Photo 11**). Some of the parts, like the boiler (**Photo 12**), the buffers, and other brass parts, stripped well. Other parts, like the chassis and wheels (**Photo 13**), didn't strip so well, but enough of the paint came off to provide a working surface. The frame had some rust on it (the black area in **Photo 14**) that had to be sanded out before it was repainted. Tinplate parts, like the cab (**Photo 15**) also stripped pretty well.

So, where to go from here? There were some additional parts that had to be made, which I figured should happen before everything got repainted. These parts included a buffer, the overflow plug on the front of the boiler, and a new safety valve.

I decided to start with the overflow plug. Since I had a good example of the same engine, I used its parts as models to duplicate. I removed the overflow



Photo 9



Photo 10



Photo 11

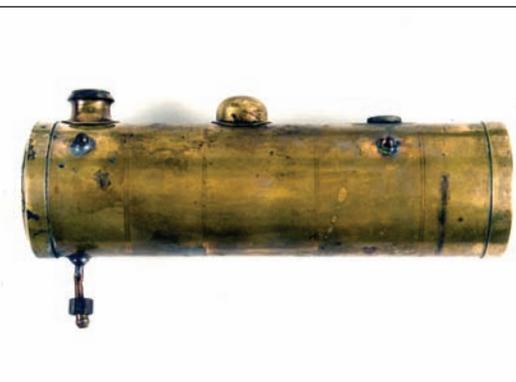


Photo 12



Photo 13



Photo 14



Photo 15



Photo 16



Photo 17

plug and measured it, doing a simple drawing to work from as I went.

I have some British taps and dies and was able to determine that the thread was a 6BA. The plug was a simple turning job that needs no description. The plug also had a handle on it — a bit of 1/16-inch brass rod. The finished plug next to an original can be seen in **Photo 16**. The original had a tiny fiber washer that seemed bonded to it. I didn't have any that size, so I made one out of a bit of gasket material, using a simple hand punch. This can also be seen in the photo.

The safety valve came next. Bowman engines use a toy-type safety. I removed the safety from my good Bowman engine (**Photo 17**) and took it to pieces (**Photo 18**), making a measured drawing of each part. None of the pieces were particularly difficult to make. I found that the main body of the valve had a 5/16-inch by 24 thread. I had no dies of that size, so I had to turn the thread on the lathe. Also, there was

a straight knurl on that part. I didn't have knurling wheels as fine as Bowman's, so used what I had.

The spindle and cap were interesting. I made the spindle first, threading both ends 5-40. Then I made the cap, drilling and tapping the end, then parting it off. I threaded the cap onto the spindle and remounted the assembly in the lathe, holding it by the spindle. Then I freehand-shaped the ogee curve of the domed cap in the lathe with files, sandpaper and steel wool.

I made the retaining nuts out of 3/16-inch hex. The original had a single nut made of one-quarter-inch hex with the corners knocked off to get through the hole in the boiler. The smaller nuts work just fine. I made a gasket for the spindle, again with my hand punch. I had a fiber washer on hand the size necessary for the main body of the valve.

The spring proved to be a little problematic. The original valve had a spring apparently made of phosphor-bronze wire, 0.030-inch in diameter. I had

Bowman LNER 265

Begun in 1923 by Geoffrey Bowman Jenkins, Bowman Models produced a variety of steam toys and models in the mid-1920s and 1930s. These included stationary engines for driving Meccano models, boats of different varieties, and locomotives.

The company produced a 4-4-0 with tender and two sizes of 0-4-0 tank engine, the larger of which is discussed here. All of these engines ran on 0-gauge track, but were over-scale for 0 gauge, being proportioned more like Gauge One models. Bowman offered a line of oversize coaches and goods wagons to suit the engines.

Bowman's locomotives were both cheap and robust and they ran well in the garden. Allen Levy, in his book "A Century of Model Trains," says that Bowman's products "... can best be described as honest, durable,

Sources: This history is based on a post on Marc's web site, "Locomotive of the Month" (<http://sidestreet.info/locos/intro.html>), which was in turn compiled from the books, "Toyshop Steam," by Basil Harley, Argus Books, 1978; "A Century of Model Trains," by Allen Levy, New Cavendish Books, 1974, and "Toy Trains: A History," by Pierce Carlson, Harper & Row, 1986.



London & North Eastern Railway: *An unrestored Bowman.*

efficient and incredibly ugly." The company went out of business in 1935.

While it is incredibly ugly, Bowman's LNER 265 is well built. It is basic in the extreme, possessing neither throttle nor reversing gear of any kind. Its speed was controlled by adjusting the wicks or by tying a longer train to the back end. Its cast-iron drivers were not connected by side rods, technically making this a 2-2-0, not an 0-4-0. The single-acting oscillating cylinders powered only the rear set of wheels.

The engine is equipped with large, brass pistons. Cylinder lubrication, very important in locomotives of this type, was accomplished by the ingenious method of building felt pads into the drive rod, immediately behind the pistons. These were

kept soaked with oil (only Bowman Loco Oil was to be used) and so constantly kept the cylinders lubricated and obviating the need for a secondary lubricator.

Alcohol was the fuel of choice in the days when this engine was built. The loco is equipped with a massive tank under the foot plate. This is filled by removing a cap in the cab. The entire burner can be easily dropped for wick adjustment. The burner itself has six (!) one-quarter-inch wick tubes. The boiler is shielded by the side tanks and a flame guard, providing extra effective surface area.

No. 265 is finished in olive green and black, with lining and lettering evidently lithographed on, unusual for a live-steam loco, but in keeping with the company's line of rolling stock.

— M.H.

nothing like that on hand, so I ordered some 0.032-inch stuff from McMaster-Carr.

After it arrived, I found that winding it was not as angst provoking as I'd expected. The spindle of the safety is 0.125 inches. I took a piece of 0.125-inch drill rod and cut a notch in one end with my rotary tool and a cut-off disc. I chucked up a piece of brass with an eighth-inch hole in the end, in the tail stock. Then I chucked up my drill rod in the head stock.

I bent the end of the spring wire 90 degrees and caught that end in the notch I'd cut. Then I inserted the notched end of the drill rod, with the trapped

spring wire, into the hole in the tail-stock piece. Then, turning the lathe chuck with one hand and holding the wire tightly to the drill rod, I was easily able to make a reasonable facsimile of the original Bowman spring (**Photo 19**). The finished safety valve next to an original Bowman valve can be seen in **Photo 20**.

I tested the finished valve using a bicycle pump with a built-in pressure gauge. I couldn't attach the valve directly to the pump but found that I could use the pump to pressurize the boiler with the valve in situ. That worked. I found that the original Bowman valve lifted at around 20 psi. Using the nut and



Photo 18



Photo 19



Photo 20



Photo 21



Photo 22



Photo 23

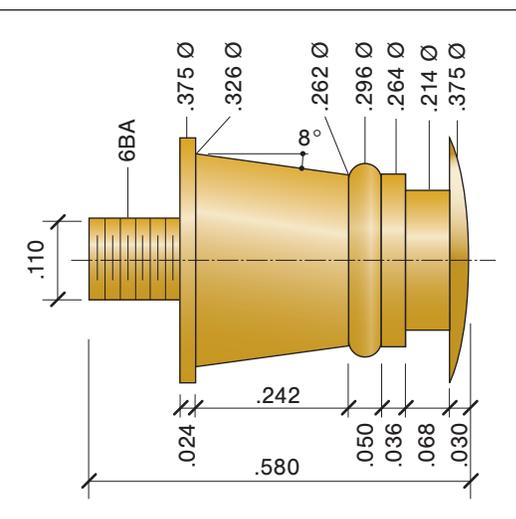


Figure 1

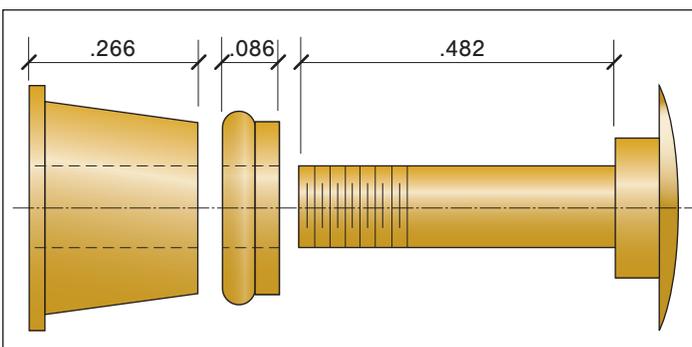


Figure 2



Photo 24

lock nut on the new valve, it was a simple matter to adjust it equally.

Once the safety valve was finished, the buffer was all that remained of the missing parts to be remade. Bowman used dumb (unsprung) buffers (**Photo 21**), which simplified the task somewhat. I found that the threaded stub was again 6BA — all good. However, the shape of the turning was fairly complex and I was a little unsure how to go about it.

The original buffers are solid chunks, probably turned with a form tool or on a screw machine of some sort. I don't have a screw machine and wasn't about to carve a form tool for a single buffer. I carefully measured an existing buffer and drew it up (**Figure 1**). It occurred to me that if I did it in pieces, each piece became relatively simple (**Figure 2**). When the new buffer parts were finished, I made a 6BA nut to go on the end. The pieces can be seen in **Photo 22**, and the assembled buffer (left) next to an original in **Photo 23**.

I thought I was done making parts but found that I had lost the meths tank cap. Making a new one was a simple turning job involving a one-quarter-26 thread, a knurled edge, and a No. 60 vent hole. The new one can be seen next to an original in **Photo 24**.

Now that all of the missing parts had been replaced, it was time to get everything ready for paint. Even though the stripper did a pretty good job on the old paint, there was still some corrosion and baked-on enamel that had to be removed. The only thing for that was the application of some 240-grit and good old elbow grease.

The time for paint had finally arrived, but what to do? A Bowman engine, when new, was a thing of cosmetic beauty, despite its crude mechanics. It had an attractive paint job, precise lining, and well-done lettering (probably a transfer of some sort).

Of course, all of this comeliness was placed in immediate peril the moment the engine was set alight for the first time, which was the point. I didn't want to put all of this work into the thing only to be left with a shelf queen — I wanted a runner. Also, my



Photo 26



Photo 25

chances of exactly duplicating Bowman's paint, lining and lettering were approximately nil. Given that, I decided to go my own way when it came to paint. I'd strive for an adequate finish and some rudimentary lining. Lettering was out.

Painting was the usual nightmare and need not be explored in depth here. Parts were cleaned with acetone, primed and painted with spray bombs. Lining on the flat parts was done with a ruling pen (bow pen) with a guide on it, using thinned Humbrol paint as the medium.

This was all relatively straightforward. However, applying lines (boiler bands) to the boiler presented more of a problem. After two or three unsuccessful attempts, I devised a way to hold the boiler true in my lathe. I then placed a metal bar in a tool holder to act as a rest for the pen. Then, while carefully turning the chuck by hand, I was able to make some

reasonable lines around the boiler in the same positions as the original boiler bands (**Photo 25**).

Once everything was painted and lined, all that remained was reassembly. This went reasonably well but there were some tricky bits. However, perseverance saved the day and the finished product can be seen in **Photo 26**, along with an original Bowman loco. I tested it on air and all seemed good.

So, how does it run? When I first fired it up, after filling the tank with alcohol and using the wicks that were already in the burner (which may well have been 85 years old), the fire lit enthusiastically. However, after a couple of minutes it died back and went out. Obviously the wicks were being starved for fuel. I pulled the old wicks and found them to be almost solid, of some unknown material. I trashed these and repacked the wick tubes with asbestos yarn.

I relit the fire with the burner out of the engine. A similar performance ensued, so I removed a strand from each tube. This time the fire stayed lit, so I replaced the burner in the engine. It took a while for steam to come up but, once it did, the engine performed well. The safety needed a little adjusting, after which the loco ran smoothly and strongly, with one problem. The gauge of one set of wheels was too narrow, so the engine didn't like the guard rails on my switches. On a track with no switches (or a tinplate track) there should be no problem.

When all was said and done, this proved to be a satisfying project (with the exception of painting). I'm glad I undertook it and I'm pleased with the outcome. Bowman locomotives are heavily made and incredibly robust. They'll run for decades, as proven by this venerable example.

A walk-through of building the latest Aster 1:32-scale kit

FEF-3

Text and photos by Charles & Ryan Bednarik

Most all of us have had the experience of building something in our lifetime, be it a Lego set, plastic model car or plane, model railroad coach or car kit, IKEA furniture, maybe even a Gauge One locomotive kit.

Recently, while watching an episode of the TV car show “Overhauling,” a comment made early on resonated with similar situations we’ve encountered when building a steam locomotive.

The host said, “Most of you watching [‘Overhauling’] know that things do not always fit together; so we have to cut, shape and trim to make it fit.” What is being referred to is that the replacement part, whether original spec or a pattern replacement, does not always fit the job the first time.

No matter how well

Aster Union Pacific FEF-3

- **Loco prototype:** American Locomotive Co. (Alco), 4-8-4, built in 1944. Cylinders: Two; 25-inch diameter, 32-inch stroke. Drive wheels: 80-inches. Boiler pressure: 300 psi. Tractive effort: 63,800 pounds. Weight: 486,340 pounds.
- **Scale:** 1:32, 45mm gauge.
- **Length:** 43¹/₄ inches (1100mm).
- **Width:** 4³/₈ inches (110mm).
- **Height:** 6¹/₂ inches (165mm).
- **Boiler:** C-type with super heater, 12 smoke tubes, 27 oz. capacity (800ml), 50 psi operating pressure (3.5 kg/cm²).
- **Fuel:** Alcohol.
- **Min. radius:** Nine feet, 10¹/₈ inches (three meters).
- **Water pumps:** Axle pump with bypass valve; tender water pump.
- **Cylinders:** Two cylinders, 5/8-inch by 5/16-inch (15mm x 24mm).
- **Valve gear:** Walschaert type.
- **Fittings:** Roscoe displacement-type lubricator, regulator valve, blower valve, reverser handle, drain-valve lever, fire box door, by-pass valve, blow-down valve, whistle valve, water-level gauge, pressure gauge, two safety valves, tender fuel shut-off valve, electric headlight.
- **Available models:** Black (No. 844), Gray (No. 837).
- **MSRP:** No. 844 kit: \$7700; No. 837 kit: \$7900.

designed a project is there is always the possibility of five “Fs” occurring during the process: fiddling, filing, freaking out, foul words and fleeing! Those who persevere through the five stages however, have that proud moment of a job well done, such as when you see your assembled engine move under its own power for the first time.

Throughout our years in the Gauge One hobby, we have built or rebuilt various types of engines from Aster Hobby Co. Inc. of Yokohama, Japan. Our experience is that if anyone has a complaint about the newest kit, then a bit of perspective is in order: try building an earlier kit. Earlier kits may have been less complex with fewer parts, but there were struggles with instructions, diagrams and fastener choices.



On the bench: *An almost completed Aster 1:32-scale Union Pacific 4-8-4 awaits a few final touches.*

Combined with convoluted mounting of hardware items and no directions on detail parts, these early kits can be both taxing and intimidating to the first-time builder. Yet, most builders have been successful through the years with the kits offered by Aster, if only through perseverance, persistence and patience.

The current generation of Aster kits provide some of the most comprehensive and complete directions, not only in drawings, but also in carefully planned written instructions that follow a methodical order to achieve success. The Union Pacific FEF-3 is the latest of these carefully planned kits.

With the FEF-3, Aster, under the direction of its North American distributor, Aster Hobby USA LLC of Campobello, S.C. has completed a trifecta of Union Pacific's most recognized and popular steam locomotives, joining the Big Boy and Challenger. There are numerous advances in Aster's offerings of the FEF-3 and Challenger compared to the earlier Big Boy. The list could make an article in itself, but here are just a few improvements between the earlier and later U.P. models by Aster: drain cocks, alcohol firing, piston valves (on Challenger) and greater

fidelity of detail as well as enhanced suspension.

There are some aspects of the FEF that were shared by the Challenger and Great Northern S2. The FEF benefited from the Challenger build with changes that made for a better process. Here are some notable improvements: tender tank design, smoke box design, overall quality of castings, drain cock design and suspension (sprung and equalized).

There are four basic keys in building a kit. First, realize that strictly building "by the numbers" will produce a model that will look good but not always perform correctly. Second, additional tools are necessary such as taps, files, supplies and the like. Third, test fit and mock up parts before applying any adhesives, sealers or gaskets.

Fourth, and probably the most important aspect, is the careful assembly of the chassis and running gear, ensuring that any lost motion in the running gear is accommodated, and getting the valve openings as accurate as possible. To accomplish these keys requires skills of clear eyes, tuned ears, rock-steady hands and above all else, patience.

In general the kit comes well organized and docu-

Four-eight-fours

Union Pacific Railroad ordered the first 4-8-4s from American Locomotive Co., in 1936 and designated them simply as “FEFs,” which was short for the words “four-eight-four.” The entire production series was also often referred to as the “eight hundreds” since all U.P. FEFs were numbered in the 800 sequence.

The U.P. 800 series evolved in response to the shortcomings of older steam power such as the 7000 Class 4-8-2 Mountain types, which had been pulling the top U.P. passenger trains for more than a decade. Increasing speed and load demands of the post-depression era demanded high power at speed.

William Jeffers, Union Pacific’s president, demanded the acquisition of new locomotives which had the horsepower to pull a 16-coach heavyweight train between Omaha, Neb., and Cheyenne, Wyo., unassisted at 70mph without service stops.

Otto Jabelmann and his team at Alco evaluated existing 4-8-4 designs and applied improvements to meet the U.P.’s specific

Sources: Hans Huwylar of Aster Hobby USA; “The Mighty 800” by W.W. Kratville; “The History of the Union Pacific Railroad in Cheyenne” by Robert Darwin; “Guide to North American Steam Locomotives” by George H. Drury.

requirements. In September 1936, the first order of 20 FEFs were delivered, which were followed by the FEF-2 in 1939 and finally the last 10 of class FEF-3 in 1944.

World War II was directly responsible for the acquisition of the third series of 10 additional FEFs. As the European campaign came to a close and attention shifted to the Pacific, the War Department projected an increase in westbound railroad traffic by 25 percent. In Summer 1944, the Union Pacific received approval from the War Production Board for 10 additional engines.

Initially, the U.P. had asked for diesel locomotives, but the Production Board denied that request. Otherwise, the U.P. would have never considered ordering 10 more steam engines. Thus the FEF-3 was produced. These last of U.P. steam were numbered 835-844.

Train assignments for the 800s were the “Portland Rose,” “Pacific Limited,” “Overland Limited,” “National Parks Special,” “The Gold Coast,” “Transcon” and “Los Angeles Challenger” to name just a few, as well as troop trains, express mail and perishable-merchandise specials.

After the end of the war, all FEFs were converted from coal to oil firing because of mining strikes in the late 1940s. A new safety requirement in certain operating divisions mandated installation of a red safety light above the stan-



No. 844: An excursion in Del Rio, Texas, in 2006. Photo by Clinton & Charles Roberts, CC BY-SA 2.0.

dard headlight. This red light was activated in emergencies and during servicing and station stops, and has become synonymous with the 800s ever since.

One of the more memorable changes was the two-tone gray paint scheme applied in 1946 to match the gray Pullman Standard coaches built between 1941 and 1946. FEF No. 809 was the first to receive the two-tone gray paint with silver striping.

mented. There are two booklets: “Assembly Illustrations” and “Written Assembly Instructions,” which coordinates with the “Illustrations.” All the manufactured pieces and hardware are labeled in boxes relative to each of the 42 section builds.

Aster has written general instructions on what is necessary to build the kit (tools and supplies) along with operational instructions to inform the customer on how to operate the locomotive. Included in the written general overview are two lists (parts

and hardware) that reference what section each item is used in during the build. There is a good historical synopsis of the FEF development in the written instructions. Lastly, there is a section on trouble shooting that comprehensively covers issues that would affect the running of the locomotive and the appropriate actions.

Suggestions to help ensure a successful build process are included below. These recommendations are here to help prevent having to undo something



During this program U.P. acquired new yellow streamline coaches. Passenger department officials suggested that all gray locomotives should feature yellow striping to closer match the new coaches. The yellow striping was immediately applied during regular locomotive shopping schedules.

Imagine what it would have been like to take passage on one of these classic trains as the golden age of passenger service was nearing its end. The travelers on the “Overland Limited”

would travel through Wyoming at Pine Bluffs, 470 miles westward with a rise in elevation above sea level from 1033 feet at Omaha to 5047. The passengers viewed the Rocky Mountains on the Laramie Range. Thirty-six miles further west the route reached Sherman, the highest point on the line at 8013 feet, with bold rock masses that had eroded into fantastic, picturesque shapes.

The route crossed the Continental Divide at Creston, 737 miles west of Omaha. At Green River passengers were treated to

views of two of the most spectacular rock formations in Wyoming — Man’s Face and Castle Rock. Soon after passing Evanston, the “Overland” entered Utah, a land which would provide passengers with close-up views of some of the most unusual and spectacular rock formations of the entire trip.

The Wasatch Mountains lead into Emigration Cañon, and then perhaps the two most famous features on the Union Pacific’s section of the “Overland,” Thousand Mile Tree and Devil’s Slide. Entering the Valley of the Great Salt Lake, the train soon reached Ogden, 1029 miles from Omaha.

But by 1952 diesels had replaced all steam in passenger service and all FEFs went back to black livery. By the end of the 1950s, steam operations ended and Locomotive No. 844, the last of the 800 series, was singled out for experimental snow melting duties. This saved the locomotive from the scrap line.

No. 844 was first stored in North Platte, Neb., with other significant steam icons, then later moved to Cheyenne to be preserved in operating condition for steam excursion specials under the Union Pacific Heritage program.

Other surviving FEF locomotives include FEF-1 No. 814 in Council Bluffs, Iowa; FEF-2 No. 833 in Ogden, Utah, and FEF-3 No. 838, which is stored in Cheyenne as a source of spares for stablemate No. 844.

— R.B & C.B.

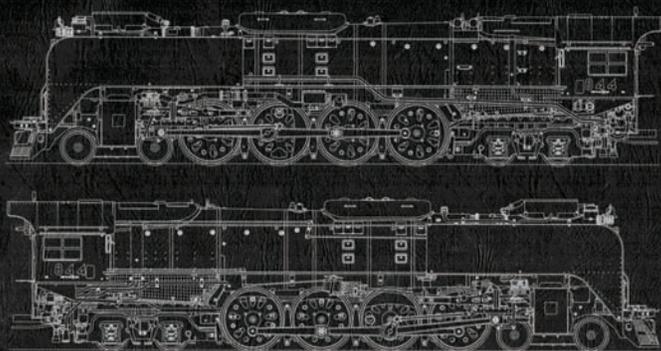
later in order to complete an assembly. These tips should be followed in accordance with the written instructions, and of course any errata supplements provided by Aster Japan and Aster Hobby USA.

Section One

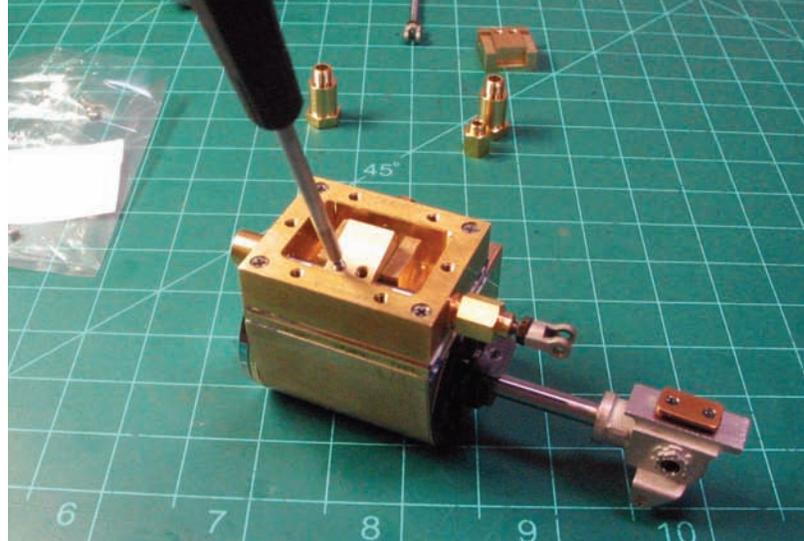
Piston fitment in cylinders: When assembling the pistons into the cylinders, back the screws off one-quarter turn on the rear cylinder cover and move the piston slowly in the bore. When you feel the same

amount of resistance (or lack thereof) in each direction, retighten the screws in a star pattern, checking the movement of the piston along the entire stroke.

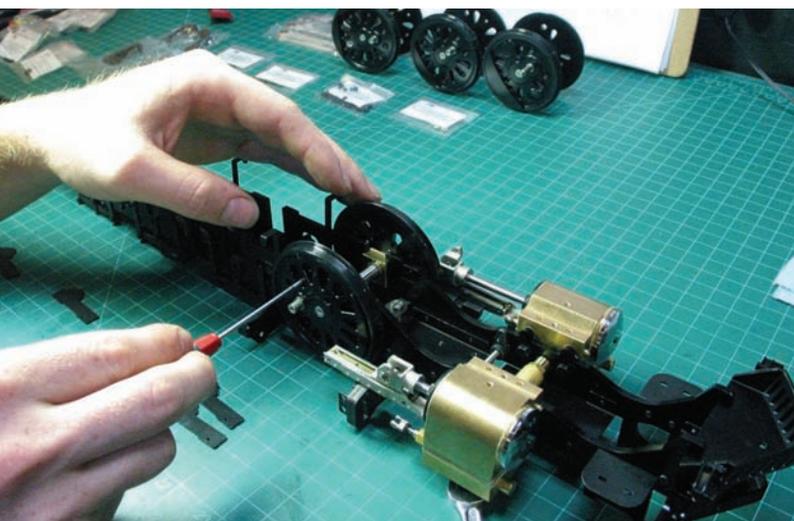
Cross head: As a preemptive step to Section Three where you fit the cross head guide, make sure the cross-head skate parts 1-3 and 1-4 are free from burrs or flashing along the sides. On part 1-4, make sure the bottom (opposite the counter-sunk side) is smooth. You can lap these parts if you desire, but a fine Swiss file will provide a good finish as well.



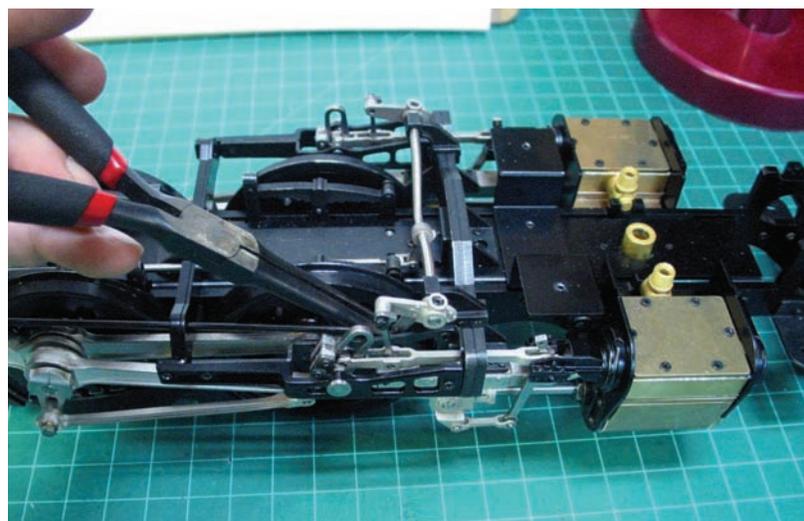
Quality docs: Aster provides clear kit instructions.



Cylinder surgery: Tightening screws on the valve.



Wheels: Attaching the drivers to the frame.



Linkage: A tight fit to get the valve gear connected.

Section Five

Cylinder drain cocks: When fitting drain cock lever parts 5-13, 5-14 and 5-15 to the frame, test fit 26-7 pilot truck saddle plate *before* tightening set screws on arms.

Drain valve lever 5-14 must be clear of the 26-7 pilot truck saddle plate in order to fit 26-7 later on.

Section 26

Pilot truck tracking: Over undulating or less than perfect track you may find the pilot truck is overly sensitive compared to other engines on the same track. Making sure any sudden dips or rises are smoothed out will help tremendously with this. However, the truck may still be too sensitive. If so see the following tips.

If you have not already adjusted the springing on the engine, loosen the

screws by one-half turn each and try running again with similar load parameters.

Should that not solve the problem, the 26-10 lower truck spring (9mm length) may be causing the truck to be overly sensitive. Removal of this spring may help with tracking issues.

Section 38

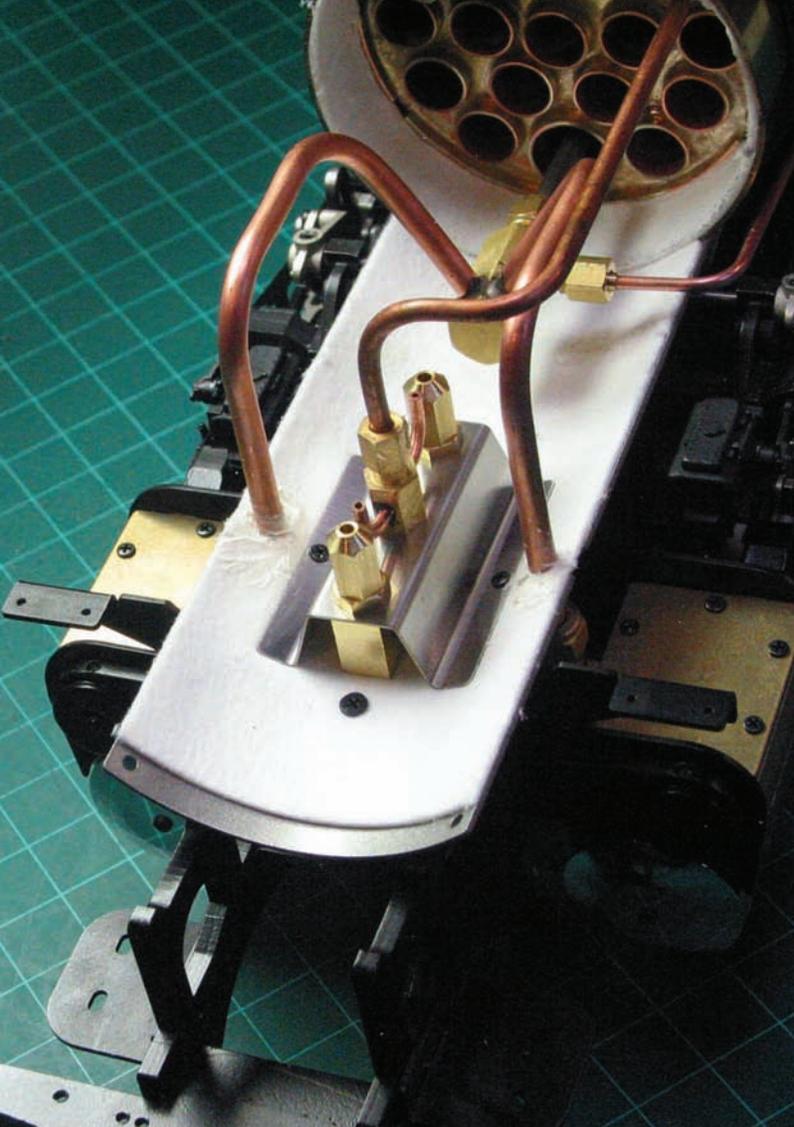
Tender truck: It may be necessary to file/grind upwards of 1.5mm off the backside of the 38-3 truck side frame casting to get good fitment.

The 38-1 inner truck frame may need to be re-bent in certain areas to allow axle boxes 35-14 to slide up and down smoothly. However, profiling/grinding the 38-3 side frames will lessen the need for this.

Brake cylinder castings 38-7 may need to have the two mounting

Follow the kit build

Ryan and Charles Bednarik built a number of the Aster FEF-3 kits for clients over last fall and winter. As they were constructing the locomotives and tenders, they made hundreds more photos than we have room here to show. But they also turned a number of those pictures into a video slide show, which is available for viewing: <https://youtu.be/oDGsivHJguE>



Smoke box: *Flues and super heater piping.*

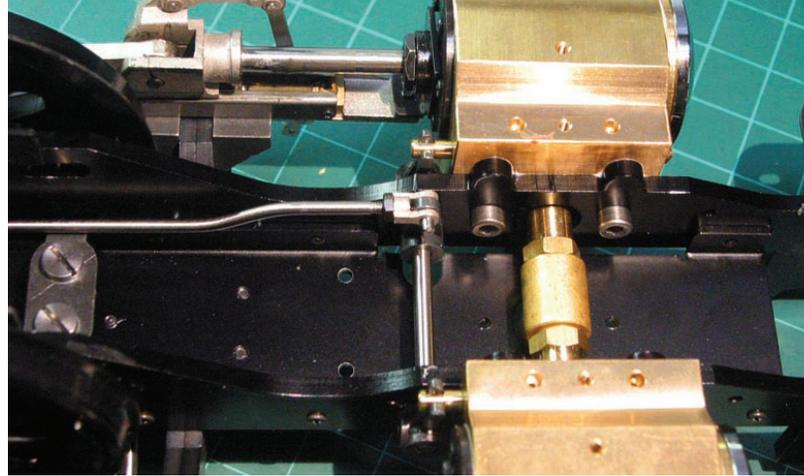
holes elongated to the outside of the casting in order to bolt onto 38-3 side frames.

Operating

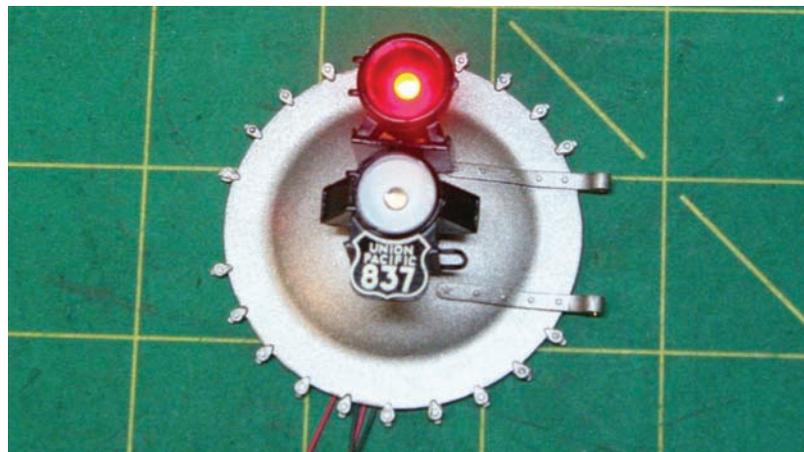
After following the usual procedures for lubrication (chassis and oil reservoir), fuel (remember to open the valves after filling), water in the tender, fill boiler (using the hand pump) and check for any obvious leaks.

Place the fan on the chimney and turn it on, having remembered to blank off one of the stacks. The FEF lights off easily either through the fire box door, or by placing the flame under the wicks. In our tests, the locomotive was up to steam (two bars or 29 psi) about seven minutes later, the fan taken off and the blower turned on. Within another minute or two the pressure was at four bars (58 psi) and the safety valves lifted accordingly.

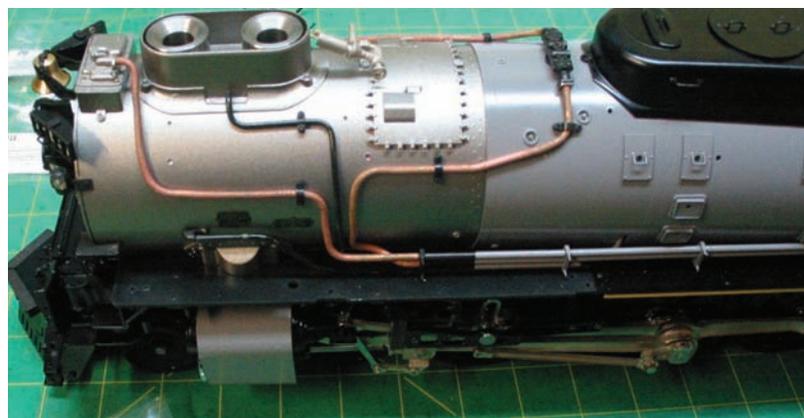
This performance of the Aster FEF was flawless, easily pulling a consist of 37 freight cars (including quite a few heavy brass cars) over a 500-plus-foot track with a ruling gradient of 0.6 percent. The run lasted for an hour continuously, water being added



Drain cocks: *Cylinders can be bled of water.*



Unique headlight: *FEF has a red light for safety.*



Pipe work: *Model accurately shows plumbing.*

on the fly to the tender. Control of the throttle was good, from 100-plus scale miles per hour to slowly walking up the grade. The engine never once showed a lack of traction, even when starting the consist on the grade. Truly an all around engine in terms of control and power.

The bottom line for the Aster FEF — it is as much a thrill to operate as it would be to ride in the cab of the real Union Pacific FEF-3. The long line of Four-Eight-Four locomotives from Aster continues with this engine. The performance and stance of the FEF is in line with the proven others; the Southern Pacific GS-4 and Great Northern S2.

D&RGW C-25 2-8-0



1:20.3 Scale, 45 mm Gauge
 Brass & Stainless Steel Construction, Coal Fired
 Available in Black Unlettered, #375 Black w/ Flying Rio Grande, and #375 Green Boiler w/ Moffat Logo
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 Brass & Stainless Steel Construction, Butane Fired
 Available in Oil Burning Bunker & Coal Burning Bunker

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N&W J-CLASS 4-8-4 #611



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QJ-CLASS 2-10-2



1:32 Scale, 45 mm Gauge
Brass & Stainless Steel Construction, Alcohol/Butane/Coal Fired
Available in Chinese QJ #6506 and Iowa Interstate #7081
Limited Production

UP 4-8-8-4 BIG BOY



1:32 Scale, 45 mm Gauge
Brass & Stainless Steel Construction, Butane Fired
Available in #4012, #4008, #4015, #4018 and #4014
Limited Production

Making a steam rail bus out of a 'Dora' and a plastic rail car

'Dordlebug'

Text and photos by Peter Thornton



Dordlebug: Completed rail bus after a run on Jim Stapleton's layout.

When Marc Horovitz talks about Accucraft's "Dora," he often comments that it would make a great power truck for a rail bus. I immediately thought of the steam railcars built in the United Kingdom by Sentinel and Metro-Cammell between 1900 and 1920. These were essentially an ordinary coach with an 0-4-0 steam truck inside one end. There were many types built in Europe and around the world — but few in the U.S. of A. I did finally find one or two — in particular a New Jersey & New York Railroad railcar (**Photo 1**).

I wasn't about to let the scarcity of prototypes stop me, so I found a used Aristo-Craft "Doodlebug" and a new "Dora." This is the story of what happens when you cram a steam engine into a plastic coach. The second part of the story involves the fitting of remote control — originally planned to be conventional radio control, but actually done with a new

type of WiFi receiver that I found on the Internet.

Conversion to steam

Inserting the "Dora" into the coach turned out to be quite easy. The coach roof was removed and the front taken off. The electric truck (probably a standard Aristo FA-1 type) was held with just two screws and four wires. On the "Dora," the body comes off easily with just four screws. The naked "Dora" was found to be about the size of the hole left when the electric truck was removed (**Photos 2 and 3**). And it looked as if the

height was good (**Photo 4**).

I had already planned that the steam truck had to be easily removable from the rest of the plastic coach, for obvious (plastic) reasons. The power truck would be independently serviced and fired, with the coach being added only when actually running. Two issues were immediately obvious: The throttle was too long and fouled the floor when you lifted the coach over the



Photo 1

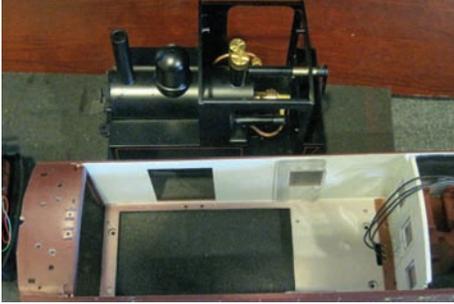


Photo 2

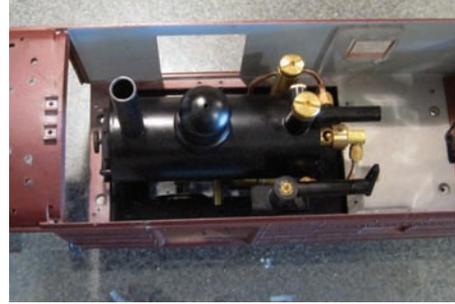


Photo 3

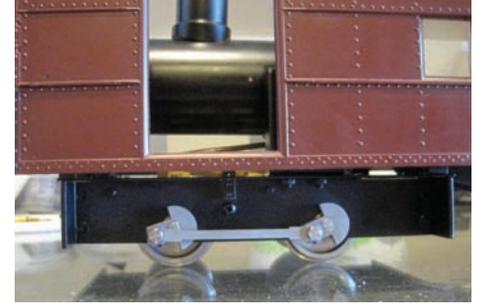


Photo 4



Photo 5

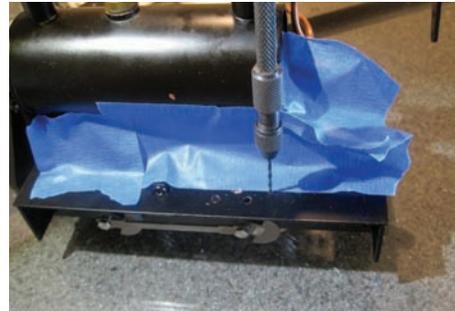


Photo 6



Photo 7



Photo 8

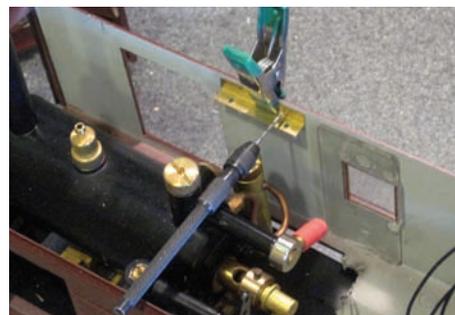


Photo 9



Photo 10

steam truck. And I was still figuring out where to pivot the truck — the filler tube seemed like a good bet as there was nothing to stop the front of the steam truck from moving on curves — but the gas tank was preventing the truck from rotating adequately on curves.

I unbolted the gas tank and tried a few alternates. It could easily move back and fit snugly against the boiler; all I had to do was drill new holes and bend the gas pipe (carefully, see **Photo 5**). I marked out the new holes and center-punched them before drilling them. As the works (cylinders) are right there between the frames, I attached plenty of masking tape to keep the chips out (**Photo 6**). I found that the new holes were so close to the frames that I couldn't fit the nuts back on the mounting bolts, but the gas jet pushed in the flue keeps things from moving, so it is currently unfastened.

The throttle was dealt with by cutting off all but about one-quarter inch. The original arm was fitted on a shouldered, thinner end piece, so I had to make a new control arm (which I finally replaced with the original when the remote control was fitted — see further along this article). I had some one-quarter-inch collars (from Servocity, **Photo 7**) which have locking screws, so I found a longer screw and put

some heat-shrink tubing on it. It shrank to tight after a few runs (**Photo 9**).

The pivot plate to be fitted over the filler tube was made from a piece of one-quarter inch plywood and I cut a couple of brass L-brackets to support it from one-quarter-inch brass angle (**Photo 8**). The brackets were screwed onto the upper part of the plastic body (**Photo 9**) and the plywood bolted to the brackets.

I then turned my attention to the coach body, and fed the roof through my mini table saw laterally to separate the front over the steam truck from the rest of the coach (**Photo 10**). The cut on the center section was one window further back than that on the lower roof, to help disguise the break. It fit nicely just behind the stack (**Photo 11**).

Continuing to replace the parts of the front of the coach after cutting a space for the stack to fit as the truck moved from side to side (**Photo 12**), I then also cut out the back of the floor behind the truck to make it easier to lift the body over the steam truck, as it was still fouling the gas jet and the throttle.

I remembered then that there is also a safety valve on "Dora," so I drilled a hole in the roof over it. With the coach body all back in one piece, and after testing the steam truck on its own, the "Dordlebug" was



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15

taken to Jim Strong's "Ops Day" on the Woodland Railway in Upper Marlboro, Md., where it managed to run without serious problems (**Photo 13**).

There were a couple of items to be addressed afterwards. I had closed the doors on the baggage compartment and I noticed the plastic was starting to bulge with the heat. The radiator in front also melted — it looks fine in the photo but is now only half height. The fact that the coach was running around a relatively small loop which kept the steam truck constantly pivoted towards one side or the other did not help.

So as soon as it got home I fitted some thin plywood along the sides next to the smoke box as insulation and fixed the doors open (**Photo 14**). I also put a piece of aluminum under the front part of the roof over the smoke box to direct the heat away. The driver was added, but not the marker lights or the like, and in that form we went to the Paradise East Steamup at Marie Brown's in upstate New York in August 2015, and ran again with no obvious problems (**Photo 15**).

Adding the remote (WiFi) control

It had always been in the plan to add some radio control and the coach wasn't short of room for batteries, wires and printed-circuit boards. However, my first task was to sort out the coach wiring and add the marker lights. The coach roof had a bunch of typical Aristo big bulbs rated about 12-24 volts, so they were removed — the 4.8-volt radio-control battery wasn't going to work with them.

All the lights at the front seem to work, but aren't powered yet. You can see tangles of original wires in the photos, but they don't affect steam operation.

I figured that I'd need a servo for the throttle, at least, and it had to fit on the "Dora" truck. I did con-

template several alternatives, such as mounting the servo near the roof and turning the throttle through a shaft with universals to let it swing and rotate. But any idea seemed to contradict the basic concept of rapid removal of the coach from the steam truck.

With the radio-control gear and battery in the coach, the servo would need wiring to the receiver, and to preserve the coach removal, it would need a quick disconnect. I posed the question "what kind of quick disconnect" on an online forum, and got some great answers, including a magnetic connector using little one-eighth-inch round magnets in pairs (quads actually, as there are two at either side of the connection).

The "Eureka" moment came when a forum member suggested wipers, like the skates used on electric model engines. With a couple of Accucraft coach-wheel wipers on the truck, and some brass strip on the plywood pivot, I reckoned I had a solution. I added a brass rubbing plate under the plywood at this time, as there were signs of burning of the wood (**Photo 16**).

The wiper/pickups were attached to another small piece of ply that was bolted to a tube fitting over the throttle sleeve. A short piece of wood had to be placed on the opposite side to keep it in position with the wipers next to the filler (**Photo 17**). The frame of the steam truck acts as ground/return, so the brass rubbing plate had another use. (By this time the "Dora" had acquired a Goodall valve, clearly visible in **Photo 17**. The boiler is not big.)

The wipers worked in testing so radio-control servo cables were soldered to them and to the coach pivot plate (**Photo 18**, which shows the extent of the truck swing, and the tangle of original wires). About this time I blew up my last servo, so I ordered some from Hobbyking (which has interesting return poli-



Photo 16

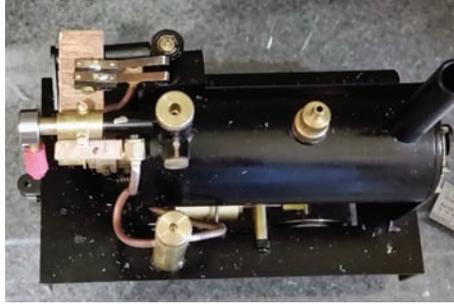


Photo 17

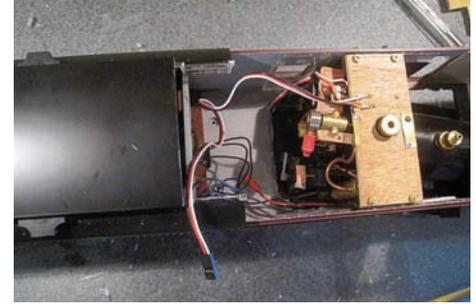


Photo 18

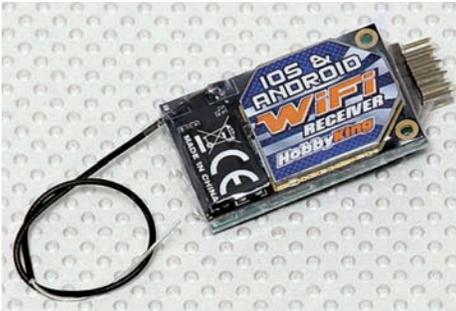


Photo 19



Photo 20

cies) and noticed a WiFi receiver — similar to a conventional radio receiver but operating on the same frequencies as wireless Internet, called an “EZC-RC wifi receiver” (Photo 19).

The WiFi EZC-RC talks to an application in your smart phone or tablet. I’m always up to playing with new stuff, so I obtained one. I ran into two issues — the manufacturer’s web site is gone and there is no app in the Google Play store for an Android phone like mine. (I think the app is in the Apple iTunes store for iPhones.) I found a link to download the program, and instructions for loading the program onto my phone. I’d never done anything like that before, but nothing ventured, nothing gained, as they say, so I took a deep breath and plugged my phone into my laptop and installed the app — without any problems.

Photo 20 shows the app main screen, with the two big white dots representing the sticks of a conventional radio-control transmitter (took me a little while to figure that out).

Photo 21 shows the testing of the WiFi EZC-RC and the wiper arrangement, with the battery temporarily placed in the coach, and a servo (held in the clamp) plugged

in to the steam truck connector from the wipers. The phone app tells you to connect the WiFi first, which turned out to be easy — my phone found the signal from the WiFi EZC-RC instantly. The app then controls the servos just like a conventional hand-held transmitter. On the phone app, the left “stick” acts as if it is spring-loaded, and the right one stays where you put it — ideal for a steam engine. The app also triggers feedback sound and vibrations as you move the “stick.” I was quite surprised that it worked so easily, but it did.

The next task was to fit the servo somewhere. I had given up on the idea of putting the servo in the coach, because of the truck movement, and mounting the servo out the back but on the truck would foul the body when I want to remove it.

So it had to be somewhere on the “Dora” steam truck. The corner of the foot plate in front of the lubricator seemed possible, so I made up a mount for the micro-servo (Photo 22). I had to somehow connect to the throttle arm, so the control arm that I had already removed was clearly the way to go — but it needed a reduced diameter shaft.

I removed the throttle spindle (again), removed the O-ring seal, wrapped it in masking tape,

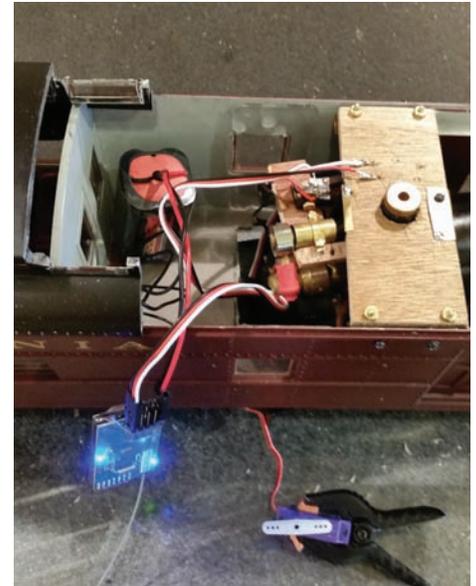


Photo 21

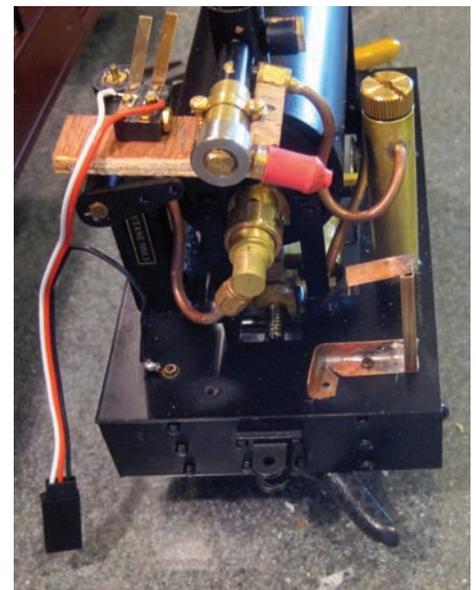
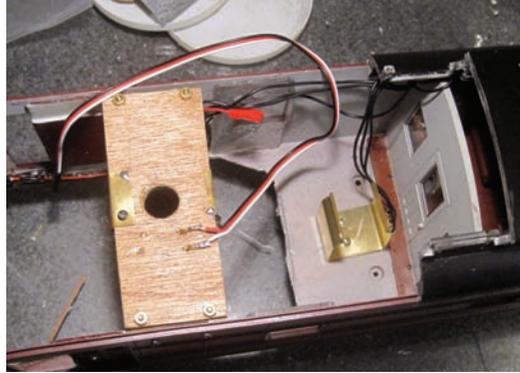


Photo 22



Photo 23



↑ Photo 25

↶ Photo 24

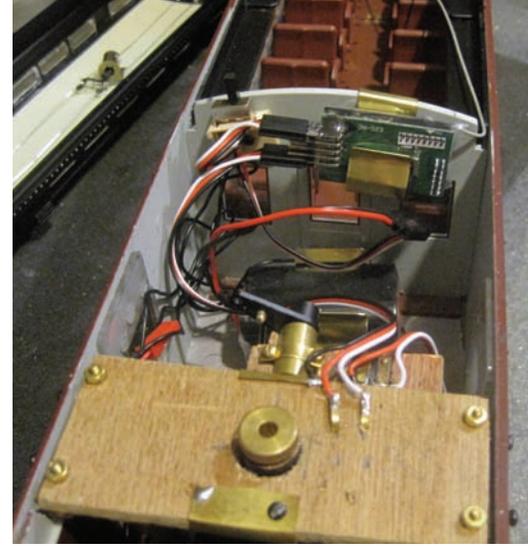


Photo 26 ↷

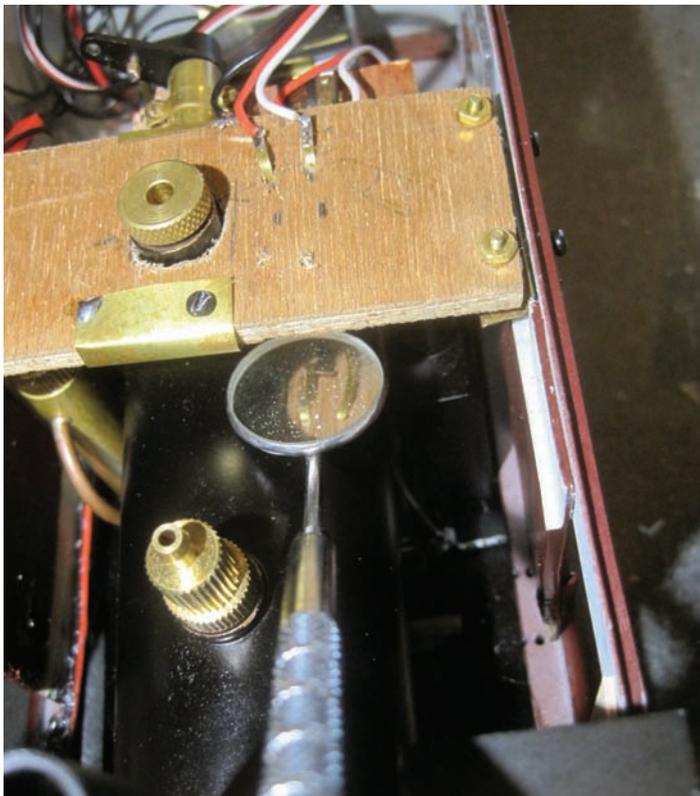


Photo 27

and loaded it in my big vertical drill press. A flat file managed to turn down the shaft considerably, until I could refit the control arm. **Photo 23** shows the spindle wrapped in tape (top left) with the end already reduced in diameter. The tape helped mark where the shoulder on the shaft had to be. On the right is the piece of the original shaft that was cut off to shorten it.

It was then a fairly simple matter to cut a piece of piano (stiff) steel wire to connect the throttle arm with the servo arm (**Photo 24**). I encased the wire in a thin brass tube for even more rigidity, as it is pushing, rather than pulling, the throttle arm.

The rest of the radio-control gear was fitted in the coach — it was nice to have lots of space compared with the tender of the average steam locomotive. A brass clip was bent up from some one-inch-wide strip

and bolted to the floor for the battery (**Photo 25**).

Another clip was bolted on the compartment wall to hold the WiFi EZC-RC (**Photo 26**). The EZC-RC is encased in plastic sheet, so it wasn't in danger of causing electrical damage. The antenna was run along the top of the coach seating.

With it all put back together, I tested the remote control, and found the servo connection disappeared occasionally — especially when the steam truck moved. Recalling I had a dental mirror, I positioned it so I could look under the plywood to see what was happening (**Photo 27**). A little judicious bending made the connection more reliable.

Early October saw us at Jim Stapleton's I.E. & W. Railroad steamup in Loudoun County, Va., where the size of the track makes range testing easy. I observed no problems — the WiFi linked and I opened the throttle, retaining control all across the layout, even from the deck adjacent to the track. "Dora" even managed a full lap without needing fuel or water.

The next steps

That's the progress to date. I obtained a sheet of ceramic insulation from The Train Department of Hazlet, N.J., and a paper template has been made to add insulation to the boiler. Hopefully that will reduce the heat applied to the plastic. A bag of stir sticks from the craft store Michaels are also sitting on my bench, intended to be clamped with brass strip on the outside of the insulation to hold it in place.

Another issue to be investigated is the burner howl. This one is really bad, so I may have to put a stainless-mesh sleeve over the burner poker or find some other fix. It certainly doesn't sound like a steamer — more like a gas-turbine.

Cosmetically, I'd like to activate the lights, which are conveniently all over this model. Unfortunately they are all 12-24 volts, so I'm likely to replace them with LEDs.

And maybe I need a trailing coach? Lots of business for railcars in 1920.

Building a 1:32-scale engine from Algerian/French prototype

Streamlined GARRATT

Text and photos by Bill Allen

Because of the uniqueness and beauty of the Algerian Double Pacific Garratts, I have wanted to build one for a long time, but I knew it would be a challenge. There were no plans or original drawings available. I did find some drawings online, but when I compared them to the photos, it was apparent that they were not to true scale.

I had some key dimensions such as wheel size, height and length which, combined with several black and white photos, allowed me to make a 1:32-scale drawing. As in my prior builds, I pinned the drawing to the wall of the shop and checked the measurements throughout the building process. According to my research, the paint color was the French railway PLM's green, which after more research was determined to be Reseda Green which I was able to get out of Texas.

Cylinders

As this was a high-speed design, the wheels are large (2¼ inches) and the crank pin diameter (cylinder stroke) is small (three-quarters inch). Because of this, I decided on five-eighths-inch cylinders to get enough torque to pull a good load. The cylinder design is similar to ones I have done before with success: I start with a one-inch square brass stock, round off one corner on the router table with a one-half-inch round over bit (**Photo 1**).



4-6-2+2-6-4:
Author's scratch-built live steam model of the French railroad PLM's Algerian streamlined Garratt.

This carbide bit has a ball bearing which keeps the bit from cutting into the side of the bar. Only one-eighth inch of material is taken off per pass. I then cut the cylinders to slightly over-length on the table saw cross-cut sled (**Photo 2**) and mount them in a self-centering four-jaw chuck. I square the ends on the lathe and part it off to finished length, then drill, bore and finally ream out the cylinder bore (**Photo 3**). A piece of 600-grit sand paper wrapped around a wood dowel gives it a nice smooth finish.

Valves

I decided to build a simulated Cossart linkage but to tie it to a working Walschaert gear and slide valves. A full Cossart with its poppet valves would not be practical in this scale. The Walschaert valve linkage with the working combination lever provides



Photo 1



Photo 2



Photo 3

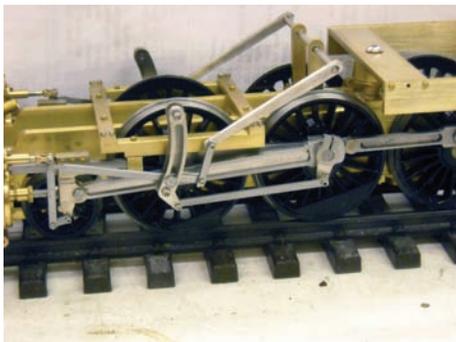


Photo 4

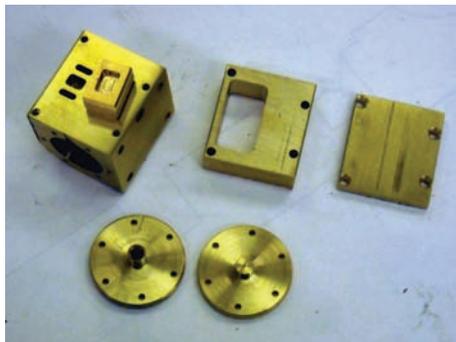


Photo 5

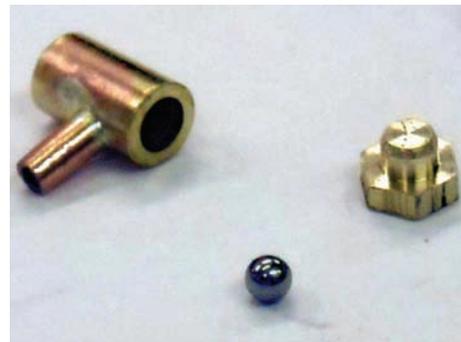


Photo 6

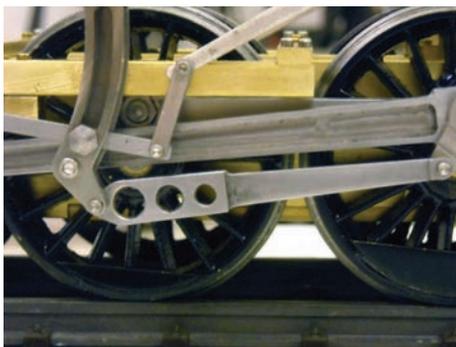


Photo 7



Photo 8

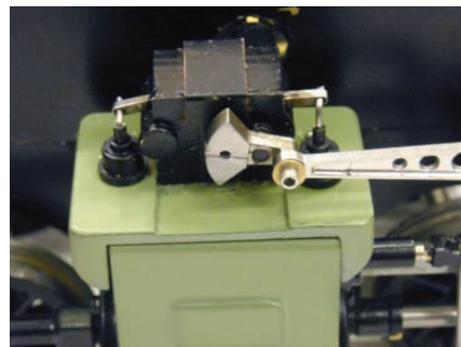


Photo 9

optimum power and efficiency (**Photo 4**).

I have found that slide, or “D,” valves seem to work best in our scale engines (**Photo 5**). They are fairly easy to make and seal a little better than piston valves. As the valve is held against its seat by the steam pressure, it can be lifted off the seat by pressure from a water-filled cylinder, thus preventing cylinder lock during cold startup. This in conjunction with automatic cylinder drains (**Photo 6**) and superheating ensures smooth startup when cold. This is important in a Garratt as the cylinders are so far from the boiler.

Streamlined Garratt

Steamer Bill Allen prefers unique locomotives and sometimes to get the ones he wants, he must build them. The Algerian Double Pacific Garratt — a streamlined 4-6-2+2-6-4 articulated engine built by Franco-Belge in the late 1930s for the French railroad PLM and discarded during World War II — is one of his more recent projects. This three-part series includes:

- ➔ **Part I: Chassis** — Building the two Pacific style frames, cylinders, valves, wheels, axle pump and Cossart linkage.

- **Part II: Boiler** — Making the boiler and smoke box, ceramic burner, cab, accessories and plate work.

- **Part III: Bunkers** — Construction of the bunker, hand pump, fuel tank, headlights, tubing and wiring.

The Cossart valve gear was popular in French engines. It was very intricate with its camshafts and poppet valves which were similar to automotive valves. Its design allowed for unlimited cutoff settings.

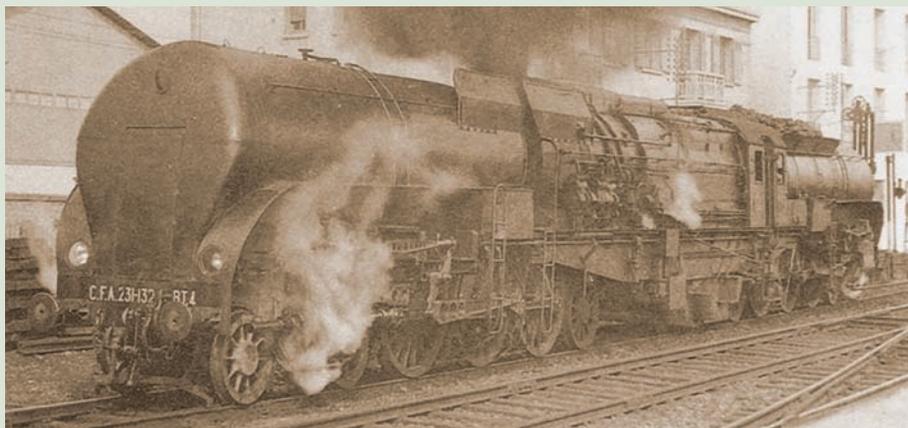
It also did not require the return crank to be offset at 90 degrees as in other gears, thus allowing it to be at 180 degrees, which allowed the mass of the valve linkage to offset that of the drive and side rods. This is why you see the heavy linkage rods. In the early engines the rods were solid, but probably because this

Double Pacifics

In the 1930s, the French railroad Compagnie des chemins de fer de Paris à Lyon et à la Méditerranée (PLM) operated in Algeria and wanted to improve passenger runs, which were slow because of heavy grades and sharp curves.

The line's runs however, included long stretches where sustained high speeds were possible. In 1936 PLM took possession of 10 Double Pacific Garratts — back-to-back engines with the wheel arrangement of 4-6-2+2-6-4 — outfitted with Cossart valves, smoke deflectors and streamlined bunkers. The standard-gauge locomotives were built by Franco-Belge of Raismes, France, under license from the inventor of the Garratt, Beyer, Peacock & Co., of Gorton, Manchester, England.

The new engines were success-



PLM Double Pacific: Streamlined Garratt in the late 1930s.

ful at cutting travel time in all of the routes. A PLM Double Pacific still holds the world record for an articulated steam locomotive of 84 miles per hour. The Algiers to Constantine route went from 12 to eight hours.

Because of the success of the Double Pacifics, ridership was increased from 5.7 million in 1932 to 11 million by 1936. On Nov. 8, 1942, though, the Allies

landed in North Africa and took over the railroad. As a result of a lack of operating and maintenance knowledge of the Cossart system and its advanced electrical reverser (which had no provision for manual override), the engines were constantly sticking in reverse, and they were all set aside and eventually scrapped.

— B.A.

caused excessive wear on the small connection pins, they were later drilled out to make them lighter (Photo 7).

Because the Cossart valves are a signature part of this engine, I wanted to at least show the two drilled rods. This was done by replacing the Walschaert return rod with the Cossart one and adding another drilled rod to the top of the expansion link.

In the prototype, the top rod turns a camshaft that operates the valves. To replicate the motion, I needed to quarter the cranks just like the wheels are quartered on a locomotive. This was done by connecting the left and right side with a shaft going through the framework.

This would have satisfied me, but my friend Dennis Mead felt we should have the poppet valve motion also, so he volunteered to make the miniature cams, follow-

ers, gears and cranks (mostly on CNC) and to print the gear case on his 3D printer (Photos 8-10).

Frame, wheels, axle pump

Both the front and rear frames are identical, so they were all cut together in the band saw and then the axle slots and holes were done in the mill. I made a serendipitous mistake when I grabbed some 3/16-inch stock at the metal yard instead of one-eighth inch.

After reviewing my plans, I found that the 3/16 inches wouldn't cause any clearance problems, would be stronger and add weight above the drivers, thus increasing traction. There are two one-eighth-inch holes in the frame rails for cross members.

I drove a one-eighth-inch brass dowel in each hole to keep the frame rails aligned during machining (Photos 11 and 12). Square axle boxes slide up and

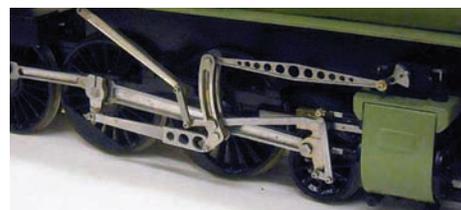


Photo 10

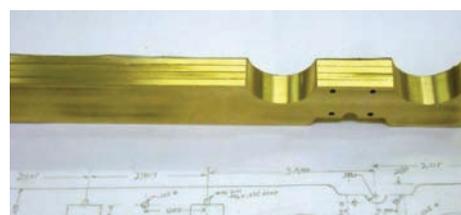


Photo 11

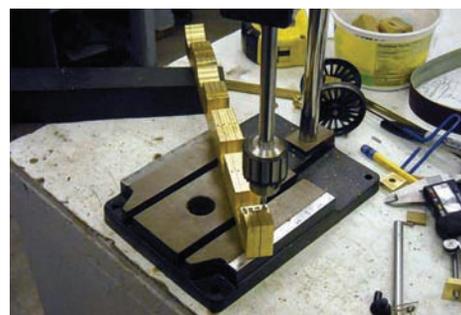


Photo 12



Photo 13

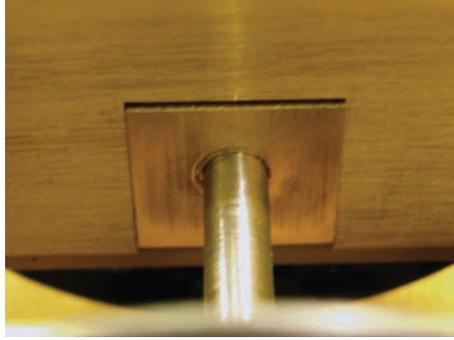


Photo 14



Photo 15

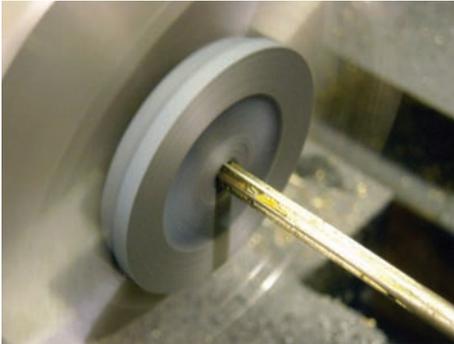


Photo 16



Photo 17



Photo 18



Photo 19



Photo 20

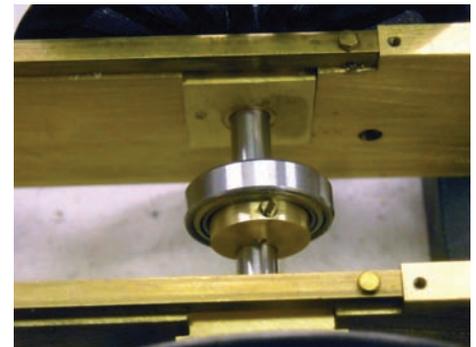


Photo 21

down the frame slots and are supported with coil springs (**Photos 13 and 14**). The spoke wheels were matched to the prototype and then were cast by Walsall in England before being finished on the lathe (**Photos 15-19**). Side bars and drive rods were done on the CNC mill (**Photo 20**).

The axle pump eccentric has a skate board bearing in it to eliminate the need to lubricate it and to reduce friction (**Photo 21**). The pump piston attaches to the eccentric with a Scotch Yoke, which is a yoke with the fork going perpendicular to the rod rather than parallel to it. When the eccentric is in the up/down mode it just slides up and down the fork, but when it moves fore and aft, it works the piston in the pump (**Photo 22**).

Most axle pumps are built to supply more water to the boiler than it normally needs, and a bypass valve is used to reduce or stop the pump flow if it exceeds the requirements of the boiler. Boiler requirements and pump output vary according to operating conditions so adjustments are usually required during a run.

I wanted to keep things simple so I decided to make the pump small enough that there would never be a need for a bypass valve. The manual pump in the rear bunker can be used to supplement the water need. I therefore decided on a one-quarter-inch by one-quarter-inch pump as shown in **Photo 23**.

Trucks, lubricators and steam lines

The configuration of the Garratt is that of a Double Pacific or 4-6-2 + 2-6-4. This configuration ensures that the leading truck is the four-wheel one regardless of which direction it is going. The pony truck pivots on a shoulder bolt attached to the axle pump body. The shoulder bolt, with the spring, attaches to a cross member at the rear of the frame.

This shoulder bolt goes through a curved slot which was cut on the mill (**Photo 24**). As there was a very close clearance between it and the Scotch Yoke, I cut an opening in the flat of the truck (**Photo 25**).

The pilot truck is similar to most with a pivot in the middle and a spring and shoulder bolt setup (**Photo 26**). As the chassis are fairly balanced over

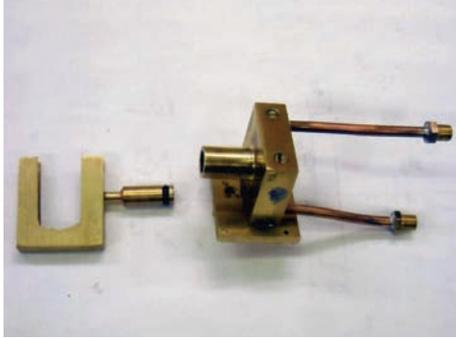


Photo 22

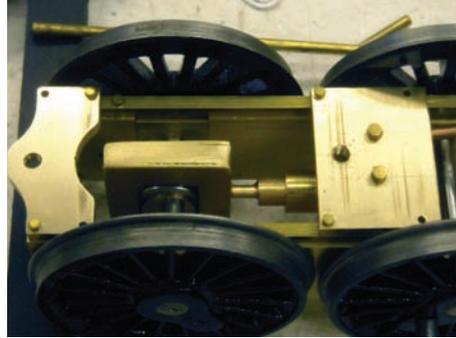


Photo 23



Photo 24



Photo 25

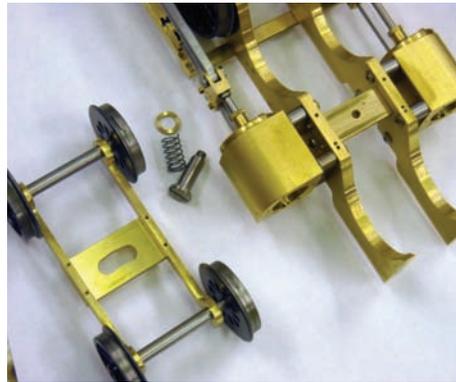


Photo 26

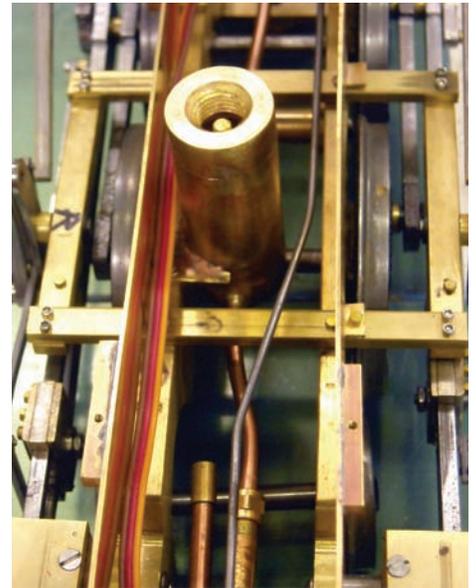


Photo 27



Photo 28

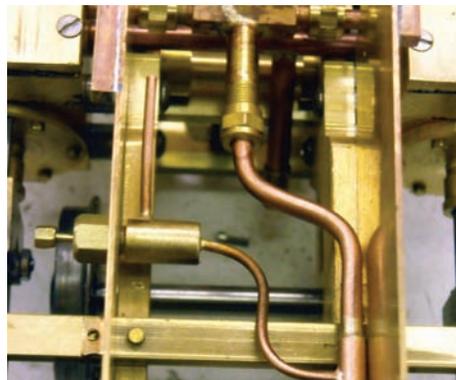


Photo 29

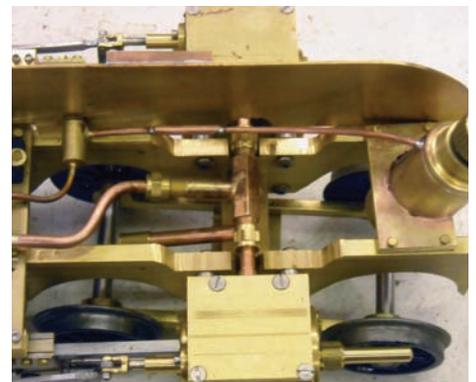


Photo 30



Photo 31

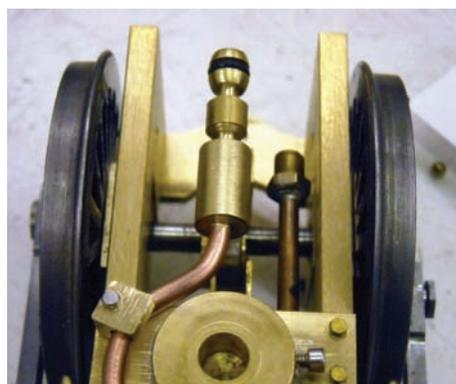


Photo 32



Photo 33

the drivers, the spring tension on the pilot and pony trucks is just enough to keep them on the track, thus keeping the majority of the weight on the drivers.

The front bunker tilts up to access the electrical equipment and the front lubricator, which comes up through the bunker floor (Photo 27). The rear bunker is fixed but the prototype had a large door on

the bunker. I used this door to access the lubricator, which is a dead-leg design with an in-line adjuster (Photos 28-30). The steam lines use a dog bone joint at the articulation point (Photos 31 and 32). Photo 33 shows an overview of the steam lines.

Next time, I'll work on the boiler, the smoke box, the ceramic burner and cab.

Readers give opinions on scenicking live-steam rail layouts

STEAM IN THE Scenery

It all started with a note from Sonny Wizelman last year. The magazine's ad manager sends me lots of notes, but this one wasn't about a recalcitrant payment or a new advertiser. Sonny the hobbyist — not the partner in the magazine — was writing about an issue near to his heart.

"Why are there so few Gauge One steam railways with scenery," Sonny asked. In almost 30 years in the hobby, he said, of all the steamups he's attended, "I can only remember one or two on which the railroad had any scenery."

Every other scale — and even most garden railways — have scenery, Sonny argued. "Why not Gauge One live steam?"

Sonny had also sent the note to our colleague Gary Woolard, who agreed. "Can a live steam layout be effectively scenicked?"

I rolled these questions into a column in the November/December issue (see *Steam in the Garden*, No. 142, "Cupola view: Line-side lament"), ask-



Scenery: Sonny Wizelman's 'Chillery's Cafe & Grill' on his Los Angeles layout. Photo by Carla Brand Breitner.

ing readers to respond.

Almost two dozen of you came back with thoughts, comments and photographs. It's probably over-simplifying to boil all these responses down to just a couple of thoughts, but let me try:

- Live steamers who migrated from electric garden railways haven't abandoned any of the scenery they had from their sparky days and have continued to add new buildings, trees and tiny people.

- At just the moment in life when a live steamer actually has more time to spend on the hobby — post retirement — it is now physically difficult to get down on one's hands and knees to fiddle with a steam throttle or to refill a gas or water tank. So many in the hobby have resorted to elevated railways, which frequently means no space for scenery.

For specific details, following are some of the best responses (photos are by the writers). Thanks to everyone for participating.

— Dave Cole

100-year-old structures

Scenery on steam railroads? My answer is “yes.” On my Zia and Columbine Railroad, which represents New Mexico and Colorado narrow gauge, I run mostly steam on a ground level railroad with about 500 feet of track. The front of the layout is on a waist-high terrace with a level 220-foot loop accommodating manual-controlled locos.

The back of the railroad includes up to 3½-percent grades which require radio-controlled or geared locos. All my buildings are 1:20.3-scale scratch built models of historic structures in New Mexico and Colorado which are at least 100 years old.

*Winn Erdman
Placitas, N.M.*



Scenery makes photos

The garden-scale train hobby is 90 percent about creating and running our historical railroad models. To me, taking pictures of our creations is the other 90 percent of the hobby.

I had a small ground-level track for a while, with battery-powered radio controlled locomotives and a few freight and passenger trains. Doing the village buildings, a farm scene, a few businesses and some scale greenery was plenty of fun (if labor intensive).

Then came the beginning of the end. I invited Bill Kay to run one of his live steamers on my humble track. Steam power was addictive and looked like a great new challenge. But there was also the dawning recognition that running steam on a ground level track can be an awkward thing. Shortly after that I joined the Michigan Small Scale Live Steamers (MSSLS) and my high-maintenance garden railroad began to slip into oblivion.

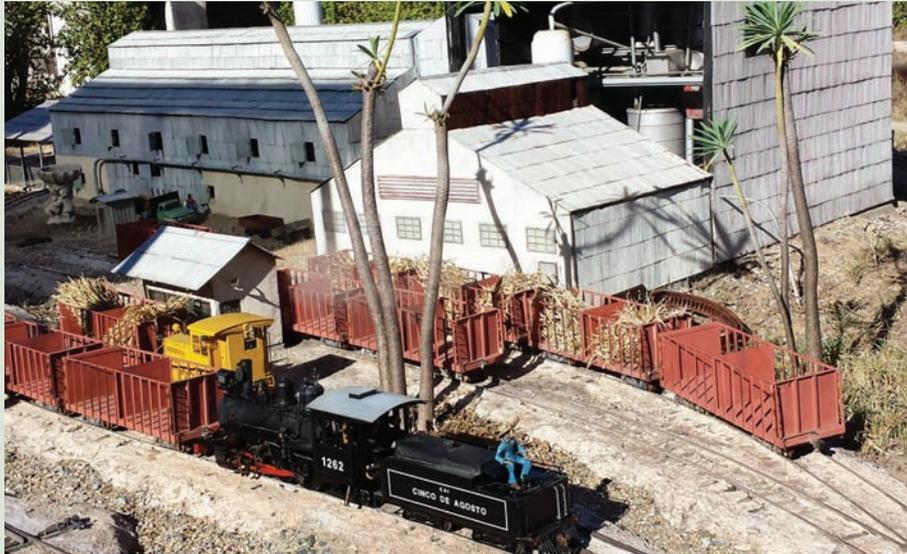
MSSLS specializes in steam runs at many venues. It was no surprise that the club's elevated, portable layouts had no scenery. But learning live steam operation meant plenty of excitement and I didn't notice the lack of scenery — for a while.

Many of our steamups are at model-railroad flea markets, often in school gymnasiums or large commercial buildings. This quickly brought the realization that gymnasiums have no scenery at all (except perhaps for the smiling faces of the youngsters). It pretty much forces you to get in tight with your photography



under poor lighting, which is ultimately limiting.

One of our yearly visits with the club portable layout is to the outdoor museum of the Huckleberry Village in Flint, Mich. The photos from there are a step up, mainly because of the period buildings



Sugar mill

Yes scenery! I wouldn't have it any other way, having come from scenic HO₃ days in my teen years. I always felt model trains had to run through realistic scenery — and be operated realistically too. I really enjoy creating and photographing a realistic scene and it's easier to do outside.

It does require a lot of extra effort outside I agree, and I don't get at it enough though I try. With California's long four-year drought it is a challenge as far as the plants go.

However I did manage to build a sugar mill and get some "palm trees" to grow on my Cuban sugar cane line, Cinco de Agosto; it is based loosely on Cuba's Central Rafael Freyre line, sometimes called Cuba's "Rio Grande Southern" for its spectacular scenery.

*Jim Petropulos
Wilmington, Calif.*



ery in the background and the runs are fun and the pictures are a notch or two up the scale. Bob's track also has a few full-size railroad artifacts in the background, which is pretty effective. Fred Gandolfi's raised outdoor layout shows off Houghton Lake in the background, for a nice effect.

Finally, there was a chance to operate at a track that had ground-level scale scenery. The Greater Cincinnati Garden Railroad Society's club layout has an elevation change which allows a waist-level yard plus a ground level run through the scenery — very convenient. So there we were, laying down on the ground trying for the perfect point of view. Nothing is easy, it seems. But getting a chance to run and photograph my locomotives next to a well made garden-scale railroading scene is an exciting opportunity. It's fun to look over your snapshots later and hopefully find a real gem.

Some of the best layouts for scenery and photos are those of sparky hobbyists. Now that we have gone over to the "dark side," our names are conspicuously absent from the invitations to many garden railroads. My solution for that is to have a steamer that is so cute and innocuous (and easy to run on

and vehicles in the background. You have to pick your perspective to make it work, but it's fun to try. Things were looking up.

Luckily, several of our members have home tracks that are open to live steam. As you suggest, many are constructed for convenience of operation and not for scale scenery.

Sometimes just being able to have a little greenery in the background can really improve the visual quality of the run. MSSLS members Bob Weltyk and Dan Samuels have layouts with a lot of green-

Rusty roof

Scenery is the one part of the hobby I do miss, but the size of the structures become too large, and outdoor structures take a beating in the weather. I have some plastic stuff that is rugged and has been outside since the mid-1990s with minimal damage. A plastic roof was replaced with a tin roof from a tin can. It is starting to rust, just like the real thing.

I have tried to do some sections of my portable layout with buildings and ballast for the track. There are only 12 feet of it scennicked and it is used when we do a public display, including at our railroad days here in Monticello.

A railroad station is made of quarter-inch foam core board and I used photos from the real station for the doors and windows. The rails are hand spiked with tie plates and real wood ties. The interlocking tower was built the same way as the station. The water tower is plastic from my outdoor railroad.

*Ernie Noa
Monticello, Ill.*



ground level), that they won't say no. Then I take as many pictures as I can until the steam runs out.

The point is that many of us steamers have left the garden railways behind. But more importantly for me, when there is an invite to run on a track with better photographic backgrounds, I try to make the most of it. If there is scale scenery, I'm doubly thankful.

*Bob Winkel
Rochester, Mich.*

Steam in the bushes

My live steam garden railway is one of the scenic variety and I would not have it any other way. After all, it was the writings of Dave Rowlands, Dave Piniger and Jack Wheldon in the British model railway press about live steam in the garden that got me into small-scale live steam 35 years ago.

In service for 25 years, my garden railway's secret is to be one of manageable size in order to keep it in good maintenance. Sure, a small size garden railway (nine-feet by 24-feet) does limit the size of locomo-

tives I can run, but it has not limited the amount of enjoyment I get out of it. To me, you can't beat the sight of a live steam locomotive working its way through the bushes and scale greenery.

My only gripe is that the railway was built when my knees and back were much younger and is now too close to the ground, particularly for coal firing. The next railway will be a fully scenic line, but likely raised on a brick or stone-faced wall for ease of operation.

*Jeff Young
Mississauga, Ont.*

Accessibility

My opinion and the opinion of the folks I talked to here is that it boils down to accessibility. Most of us are just too old to deal with a ground-level track.

For my part that is sad, but it does bring up a marketing opportunity for the Finger Lakes Live Steamers, who will now advertise our invitational meets as having both an elevated track and a garden



Third time's a charm

We're on our third outdoor layout and we have always had "scenery" in the form of buildings and miniature conifers and other plants. We also have never had track power, leaving the motive power to windup, battery and live steam.

Our first layout was quite extensive, at ground level (ouch), and had lighting for the buildings, industries and eight sepa-

rate rail lines so many could run at once.

The second was around a pond, smaller but decorated, and made it all the way up to knee height. Better but not there yet.

This one is in the back yard. The original slope of the yard was cut to provide an area for the drive apron. This allowed for about a four-foot-high plus side of the track, to make the operators more comfortable. It

also allowed for a nice observation angle for Shays and other engines with good motion.

There are three tracks. The outer has dual gauge (O and One), middle is Gauge One, and top is Gauge One with much smaller radii. The middle has buildings and plantings. As this is visible from the house window all year long, it provides a much better view than track only would, and running it allows things to disappear until one just gets nervous enough, and then show up again.

The buildings, typical of my approach, are of no particular scale and sameness, which is how we like it. I recommend this to any who would like a differentiated look that integrates into a garden.

*Chip Rosenblum
Columbus, Ohio*

layout for live steamers to use. Here are pictures of our garden layout: <https://goo.gl/FHfYGS>.

The goal in the next couple of years is to install more "scenes." The plan was always to use the elevated trestle for steaming up and that works well for radio control. However we were not getting as many live steamers as we thought were around, so we also built a 35-foot diameter oval elevated track that is much more amenable to non-radio control locomotives.

On a personal level, my garden railroad is ground level (<https://goo.gl/Dr75VT>). Because most of the time trains are not running, I like the look of the ground-level layout, but it is harder and harder to run steam.

Ideally, raised beds in a small garden like the British do would combine accessibility and scenery best. Raised garden beds in this area are expensive so I don't know of any who have gone that way.

*Roger Caiazza
Liverpool, N.Y.*

Raising trains

I will reach my 70th birthday soon and I had to raise my trains instead of lowering myself, but I don't intend anytime soon to abandon the hobby.

I had a small ground layout, an oval of 75-feet by

40-feet that went under the deck. I only had two structures, both made using the Jig Stone molds.

Because of the deterioration of the knees and hips, I found it difficult to get up, once down to tend to the train. I then built an elevated oval of almost the same dimensions with a double main line, one with stainless steel track for the sparkies and the outer with aluminum track for the live steamers. Both have sidings, but no structures, although the Jig Stone structures are still outside and still in fine shape.

I do enjoy seeing a layout that has beautiful track-side scenes.

*Nick Peluso Jr.
West Berlin, N.J.*

Stilts

My garden is 16-feet wide, wall to wall, and I don't even own half the walls. There is a lot of hardscaping, and two trees that were grandfathered in when I installed the railway. At my age, a ground-level layout is not attractive. So what I have is a ribbon of track on stilts snaking between the trees. I am planning to add some decorative bridge and viaduct work, but that is all that is practical.

*Henry Blanco White
Philadelphia*

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Vol. 25, No. 1; Issue 143; Jan./Feb. 2016

Micro layout: Building an indoor Gauge One track • Review of Wuhu Bowande Porter • Hot-rod 'Ruby': Hopping up a 1:20.3-scale engine • Rolex Asters: Adding radio control • Learning to model in tinplate with a 'Dora' modification, Part III • Latest waybill: Llagas Creek Railways sold, U.K. distributors merge.



Vol. 25, No. 6; Issue 142; Nov./Dec. 2015

Sacramento stationaries: 2015 National Summer Steamup highlights • Review of Wuhu Bowande G5 • Building an Accucraft 'Ruby' kit • Learning to model in tinplate with a 'Dora' modification, Part II • 7/8ths WWI car • New products: 1:32-scale U.K. 'Victory,' 1:20.3-scale 8-driver Saxon.



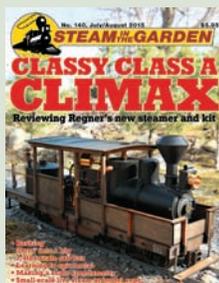
Vol. 25, No. 5; Issue 141; Sept./Oct. 2015

Mamod's latest: 'Brunel' • Learning to model in tinplate with a 'Dora' modification, Part I • Live-steam group makes sixth appearance at Maker Faire • Adding mesh to Accucraft burner • Salute to Tom King • New products: Aster 0-4-0, Wuhu Bowande German 2-6-2T, Train Dept. with two 7/8ths-scale.



Vol. 25, No. 4; Issue 140; July/August 2015

Classy Class A Climax — Regner steamer and kit review • Big 'Dora' — Making it a 1:13.7-scale railbus • Spinning metal • Cabin Fever • Speedometer • Latest waybill: Garratt from Roundhouse; in memoriam — Peter Jobusch; Accucraft UK goes with an African steamer; Mamod saddle-tank loco.



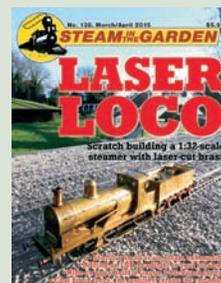
Vol. 25, No. 3; Issue 139; May/June 2015

Steaming amongst the magnolias: Diamond-head 2015 • Laser Loco: Aspinall 0-6-0 (series Part Two) • Workshop: sample tools and equipment • Wicks: A new material • Open cab 'Dora' • Latest waybill: Swiss, U.S. locomotives on the way; a new version of Saxonian in 1:20.3 scale.



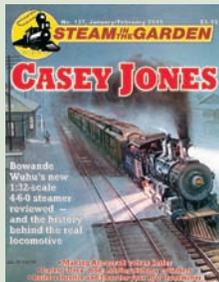
Vol. 25, No. 2; Issue 138; March/April 2015

Laser Loco: Scratch building with laser-cut brass. Part 1 • How steamers in Seattle created a community • Getting an LED onto the front of Accucraft's C-19 • Two former ride-on live steamers decide to go to Gauge One • Romance, realism of coal firing: factors to consider before taking the plunge.



Vol. 25, No. 1; Issue 137; January/February 2015

Expand Accucraft cylinder ports • Casey Jones: a new 10-wheeler from Wuhu and the engineer's history • R/C J-bar: adding steam controls to transmitter • Dummy cylinders: Give 'Dora' a more realistic look • Railroad librarian: 'Great American Railroad Stories'; 'The State Belt.'



Vol. 24, No. 6; Issue 136; November/December 2014

Sacramento steams. The 2014 National Summer Steamup provides a fun time for more than 150 steamers • Replacing axles • Scratch-building the four-cylinder Heisler, Part Three • The backyard Rivendell & Midland Railroad, Part Two • 'Dora' gets a snow plow (and a bell and a ...).



Vol. 24, No. 5; Issue 135; Sept./Oct. 2014

A big little locomotive: Accucraft's 7/8ths-scale 'Fairymead' • Scratch-building the four-cylinder Heisler, Part Two • The backyard Rivendell & Midland Railroad, Part One • Build a train barn • Review: Regner's 'Otto' • Latest Waybill: Accucraft 1:32-scale rolling stock; end of boiler detection; new wheels..



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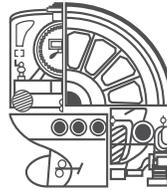
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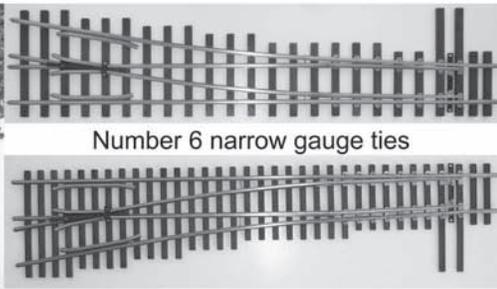
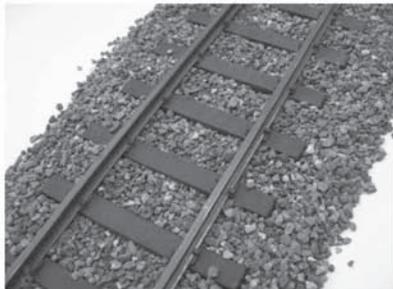
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Porter points

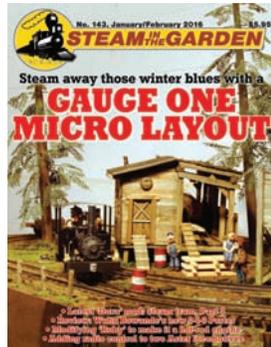
Grover Cleveland's review of the revised Wuhu Brand Arts & Crafts Co. Ltd. Porter was good (see *Steam in the Garden*, January/February 2016, No. 143). Some background:

My wife I-Ming and I saw and examined some terrific live-steam engines at the National Garden Railway Convention in Ohio in June 2013. They were manufactured by Bowande Wuhu, then a new business in China, marketing for the first time in the United States.

With I-Ming translating my technical questions into Mandarin, I had a good discussion with them. I was amazed at the quality of machining and materials, especially the Stephenson valve gear.

As a new company, they asked for assistance in analyzing the overall quality and functionality of their first U.S. loco, the Porter, to hopefully avoid mistakes that had been made by other manufacturers. I made eight or nine recommended changes which were accepted and result in the current Porter.

The major changes I suggested were a revised throttle with more gentle taper for much better control, a drain plug for the oil lubricator, reloca-



tion of the difficult-to-access fill plug from the cab to the boiler, include Goodall valve in-fill plug, boiler enlarged 28 percent, modified driver springing and revised gas adjustment to make it less sensitive.

The Porters need three to four hours break-in. With water added via the Goodall valve, we have seen runs of 16-19 minutes from engines bought from us the day before.

One-eighth to one-quarter opening on the steam injector for the lubricator seems fine, and there is still some oil in the tank after gas runs out.

Grover is correct about firing. We let the fire stay in the flue for about eight-10 seconds — the pipe gets hot and by gently closing the gas you'll see it pop back into a blue ring in the fire box. It almost always stays lit after one or two attempts.

The improved operation of the revised Porter engines led to our joint development of USA prototypes with Wuhu Bowande, resulting in the mid-size Rogers-built "Casey Jones" 10-wheeler and then all three versions of the Pennsy G5 4-6-0, all of which have been well received and had great reviews.

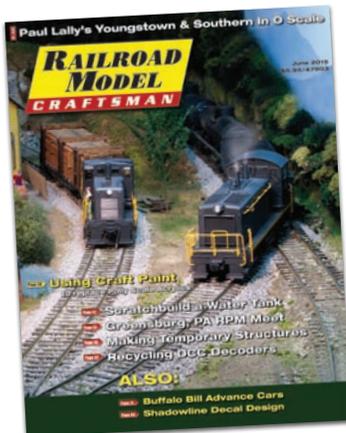
*Bob and I-Ming Clark
Stoke 'M and Smoke 'M, Monrovia, Md.*

Livesteamese

I wanted you to know I recently read "Starting in Steam," and found it to be well organized and thorough.

Though the book is aimed at new steamers, even the veteran can learn new things from its pages — I know I did. Each chapter is a stand-alone *exposé* on its subject. The chapters are organized in such a way that they walk you, step-by-step, through each aspect of operating a live steam locomotive. So one can read it through like a book (cover to

SOME THINGS ARE JUST BETTER TOGETHER!



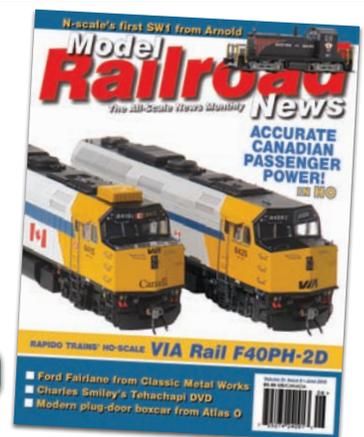
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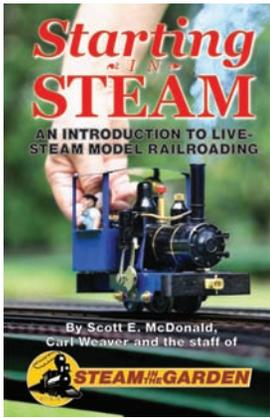
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cover), or it can be used as an encyclopedia.

The glossary is a very useful addition to the book. Just like any hobby or profession, live steamers have a language of their own. Many terms can be baffling to a novice. A quick read of the glossary will have one understanding and speaking Livesteamese. (Not familiar with that term? Livesteamese is the language

spoken by live steamers at steamups. This language may appear to be spoken only between steamers and understood only by them. In reality the language is a precise means of describing various aspect of live-steam operations and of live-steam locomotives.)

The physical size of the book is just right. It can easily fit in one's tool box where it can be kept as a handy reference book.

I consider this book to be *the* primer for small-scale live steam. I would recommend it to anyone starting out in small-scale live steam and to veteran live steamers alike.

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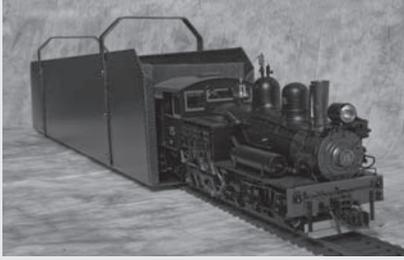
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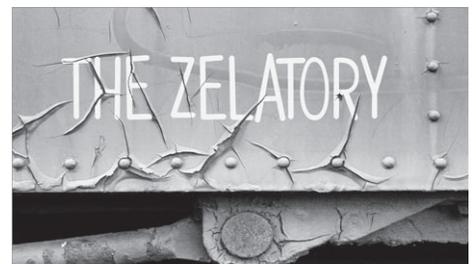
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April 21-24, 2016 — Spring Steamup, Staver Locomotive, Portland, Ore. Info: <http://www.staverlocomotive.com>.

July 4-10, 2016 — National Garden Railway Convention, Santa Clara, Calif. Self-guided and motor-coach tours of area garden railroads; clinics, vendor hall, speakers, banquet, ice cream social. Steam layouts. Info: <http://ngrc2016.org>.

July 13-17, 2016 — National Summer Steamup, Lions Gate Hotel, McClellan, Calif. Clinics, dealers' room, door prizes, swap tables, Saturday night BBQ. Lions Gate room reservations: (916) 643-6222 (<http://www.lionsgatehotel.com>). Info: <http://www.summersteamup.com> or (650) 898-7878.

Sept. 7-10, 2016 — Thirty-sixth National Narrow

Gauge Convention. Augusta, Maine. Layout tours, modeling contest, modular layouts, clinics, dealers' room. Info: <http://nngc2016.org>.

Sept. 15-18, 2016 — Fall Steamup, Staver Locomotive, Portland, Ore. Info: <http://www.staverlocomotive.com>.

Nov. 25, 2016 — Turkey Trot Run, invitation-only Gauge One steamup. Pennsylvania Live Steamers, Collegeville, Pa. Info: <http://www.palivesteamers.org>.

Jan. 8-15, 2017 — International Small Scale Steamup and Arts Festival, Diamondhead Inn and Suites, Diamondhead, Miss. "Flea market," seminars, dealer tables, a festive meal and extracurricular activities. Diamondhead Inn & Suites: (228) 255-1300. Info: Patrick Darby, k5pat@bellsouth.net, (985) 867-8695; <http://www.diamondhead.org>.

Jan. 13-15, 2017 — Cabin Fever Model Engineering Expo, Lebanon Valley Expo Center, Lebanon, Pa. Info: <http://www.cabinfeverexpo.com>.

Feb. 10-12, 2017 — 19th Annual Presidents' Day Steamup, Electric City Trolley Station & Museum (Steamtown), Scranton, Pa. Two tracks in G-gauge and O-gauge. Info: Clem O'Jevich Jr., (570) 735-5570 or wrunloco@aol.com.

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Upstate N.Y. Steamers. Several steamups per year in various locations around Western New York. Info: <http://www.tinyurl.com/upstatedeamers>.

Southern California Steamers. Contact Jim Gabelich for dates, places and other pertinent information. (310) 373-3096. jfgabelich@msn.com.

Crescent City High Iron. Steamups as necessary on an elevated backyard layout on Northern California's upper coast. Info: Don Cure, diamondd1947@msn.com.

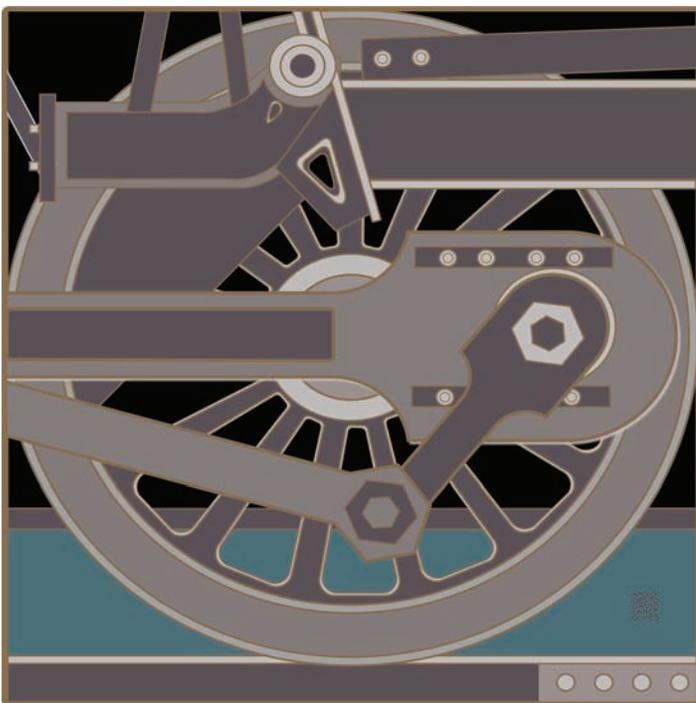
On the Brink Live Steamers. Wednesday, and occasional weekend, greater Sacramento, Calif., steamups on elevated live-steam tracks at two locations, as well as special events. Info: Paul Brink, (916) 935-1559, paulbr@aol.com.

Puget Sound Garden Railway Society. Two steamups per month, one at the Johnsons' on the second Saturday and a steamup at a member's track on the fourth Saturday. Info: <http://psgrs.org/> or call Pete Comely at (253) 862-6748.

Michigan Small Scale Live Steamers (MSSLS). Info: <http://www.mssls.info>.

Greater Baton Rouge Model Railroad Club Open House and Gauge One Steamup. Info: Ted Powell, (225) 236-2718 (cell), (225) 654-3615 (home), powell876@hotmail.com.

Pacific Coast Live Steamers. Irregularly scheduled backyard steamups, mostly in S.F. Bay Area. Info: <http://www.p-c-l-s.org>.



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Small-scale live-steam railroading — using models that are anywhere from 1:13.7 scale to 1:32 scale and run on 32mm or 45mm track — is a fun hobby that has room for rivet counters and freelancers, prototype purists and lovers of whimsy.

Steam in the Garden is the only magazine devoted entirely to covering the small-scale live-steam hobby. Since 1990 the magazine has taken readers inside the railroads and inside the workshops of the leading modelers and shown how fun and easy live steam model railroading can be. Six times a year, *Steam in the Garden* gives subscribers a look at the current trends in the hobby and reviews the latest products available.

Are you a builder of live-steam models (or do you want to be)? *Steam in the Garden* has detailed articles that explain how experienced builders create those once-in-a-lifetime projects that can't be found anywhere else.

Do you just want to run trains? *Steam in the Garden* explains how to build the best backyard live-steam railroads and how to

build portable layouts as well.

Want to make improvements on your locomotive? *Steam in the Garden* has dozens of articles every year that show you in detail how to add features to your small-scale loco or make your rolling stock run better.

Want to know what's happening at the leading live-steam events? *Steam in the Garden* will take you there, to give you a flavor of what's happening, both on the track and in the clinic rooms, as well as the latest products shown by exhibitors.

Steam in the Garden has a new editor, but the magazine is sticking to its 20-year history of giving hobbyists the best information, illustrated profusely, in an easy-to-read format. Fill out the form below and subscribe today to *Steam in the Garden*.

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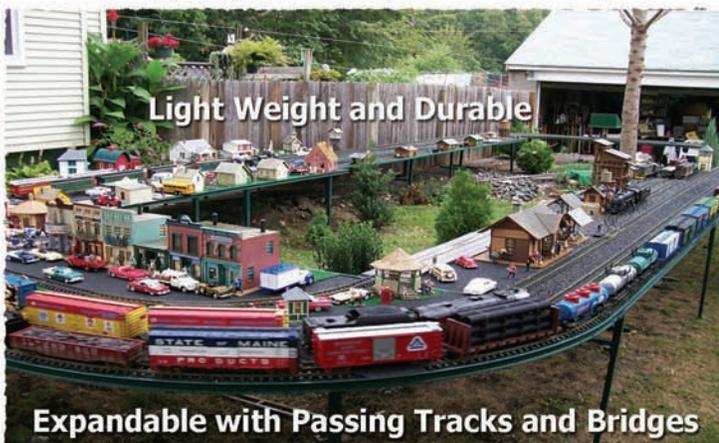
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