



No. 126, March/April 2013

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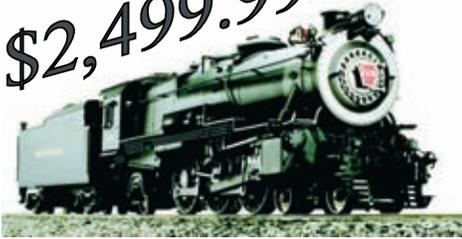
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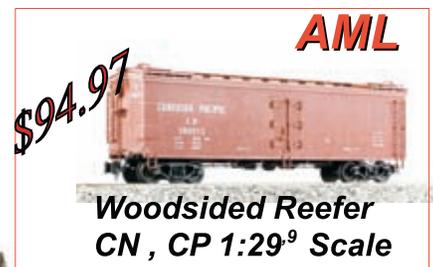
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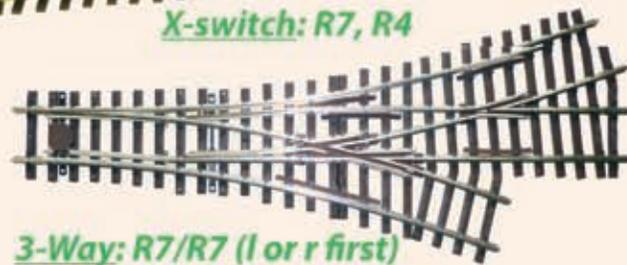
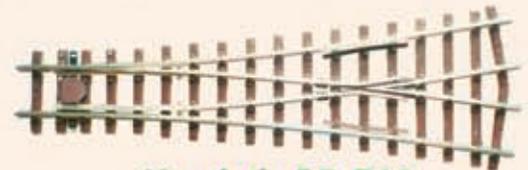
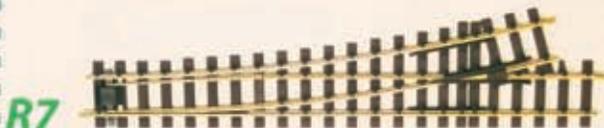
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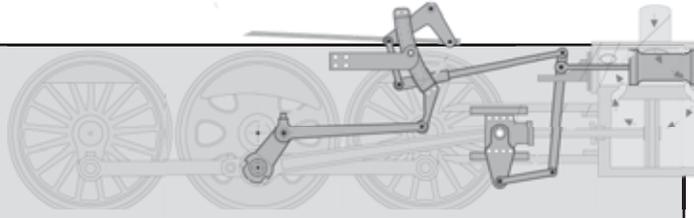
# STEAM IN THE GARDEN

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

# 17

**Starting in steam:** Choosing your first locomotive. Analyzing the factors in order to get that perfect first live steamer. **By Scott E. McDonald.**

# 22



**Starting in steam: Valves.** The mysteries of this crucial component of small-scale live steam locomotives are explained. **By Bill Allen.**

# 30

**7/8th cars.** How one live steamer solved the dilemma of a lack of rolling stock in 1:13.7-scale by using 1:20.3-scale flat cars. **By Dave Frediani.**



**Operations.** This hobbyist wanted his backyard to be a realistic miniature world and modified his layout and locomotives for scheduled live-steam running with multiple trains. **By Jack Verducci.**

# 32

# 35

**Diamond in the chuff.** A diamond-style smokestack was reluctant to submit to the charms of a chuff enhancer. Two amateur machinists came up with a resonator design that added depth as well as volume. **By Rob Lenicheck and Dennis Mead.**

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Editor ..... **Dave Cole**  
dmcole@steamup.com  
(650) 898-7878, Fax: (650) 475-8479

Advertising Manager .... **Sonny Wizelman**  
ads@steamup.com  
(310) 558-4872

Circulation Manager ..... **Marie Brown**  
circ@steamup.com  
(607) 642-8119, Fax: (253) 323-2125

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

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Dan Pantages ..... Howard Freed  
**President** ..... **Secretary/Treasurer**

Marie Brown ..... Scott McDonald  
Dave Cole ..... Paul Scheasley  
Sonny Wizelman

**Editorial:** P.O. Box 719  
Pacifica, Calif. 94044-0719 USA

**Advertising:** 10321 Northvale Road  
Los Angeles, Calif. 90064-4330 USA

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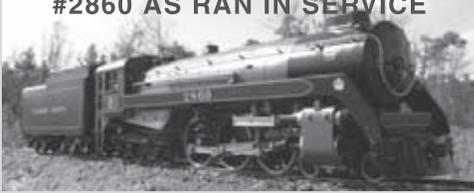


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## RAILWAY POST OFFICE

### Stuck key?

Nice job on the latest issue (*SitG*, January/February 2013). I hope you got your "4" key unstuck so it doesn't repeat accidentally again. It had to be a shocker when you saw the printed cover. Nonetheless I enjoyed reading all the articles.

*Clark Lord  
Las Vegas, Nev.*

*Editor's note: The key wasn't a stuck: the Whyte notation on the cover that added an extra set of trucks to the Accucraft T1 was all the editor's fault.*

### Correction

In the January/February 2013 article "New owner for Regner U.S. distribution," your editor confused the relationship between The Train Department and The Car Works: Jason Kovac owns The Train Department and also works as a salesman for The Car Works, which remains Stan Richmond's business. The editor apologizes for the mistake.

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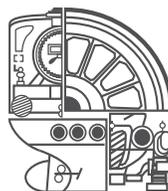
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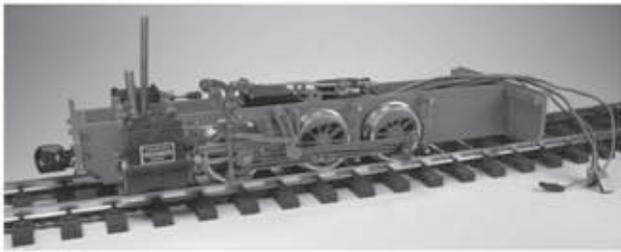
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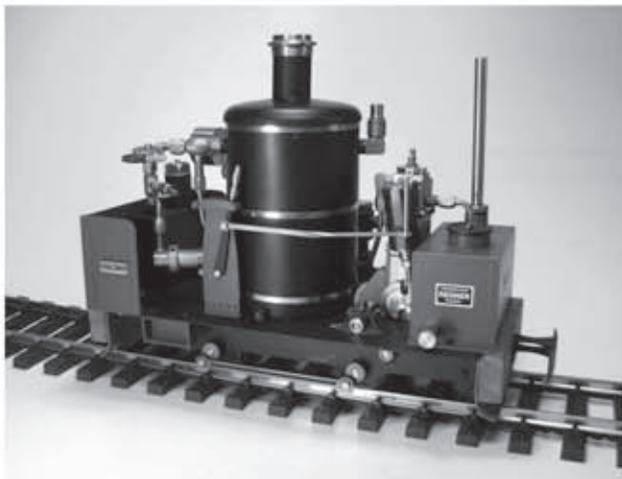


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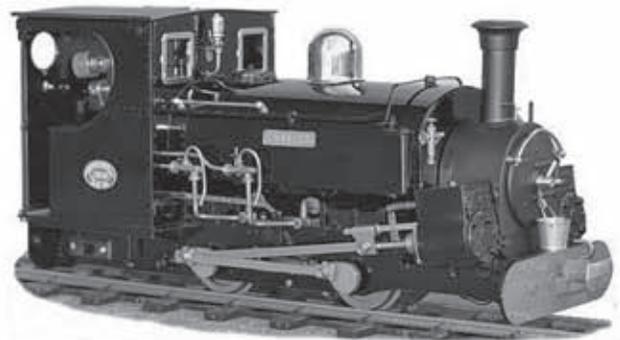


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## LATEST WAYBILL

### 16mm group grows

England's Association of 16mm Narrow Gauge Modellers said in December that 2012 was its best growth year ever and that membership is now in excess of 4120. The group added 385 new members in 2012, it said, which was one more than in 2009, its previous best-growth year.

"Interest in large-scale garden railways continues to grow – and the 16mm scale has never been better supplied with off-the-shelf live-steam locos," said Nigel Town, the group's chairman.

The group focuses on trains scaled at 14mm to 16mm to the foot, or about 1:19-scale. In this environment, 32mm track (O-gauge) represents two-foot (or 27-inch) narrow-gauge operations and 45mm track (G-gauge) represents 30-inch, three-foot or one-meter narrow gauges.

Association membership is truly worldwide with clusters in the United Kingdom, North America and "the Antipodes" (Australia and New Zealand), a wide range of European countries and members in places as

far apart as Greenland, Bermuda, Thailand and Japan.

The group publishes a quarterly magazine – *16mm Today* – as well as an annual DVD and members' handbook. North American annual membership is £27 (about \$44.50) and can be paid via PayPal on the group's web site, <http://www.16mm.org.uk/> and its mailing address is Membership Secretary, Alan Regan, 45 Hollow Wood, Olney, Bucks, MK46 5LZ, United Kingdom.

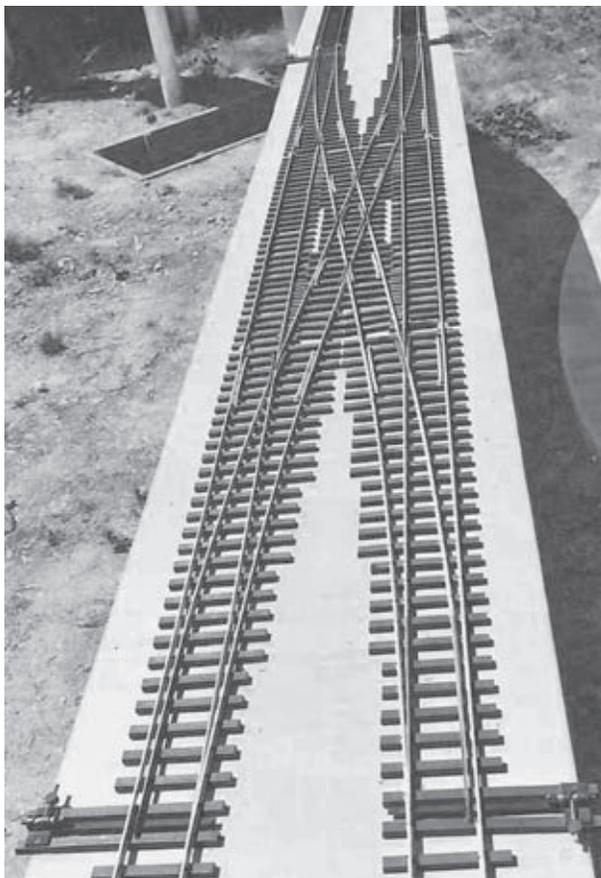


**Bulletin:** A supplement that focuses on the group's activities.

### Aster to add another Brit

Aster Hobby Co. Inc. of Japan said in January it was planning a new 1:32-scale British locomotive, the "Merchant Navy Class." The company would only say that it plans to have the live-steam model ready this year and provided no other details.

Oliver Bulleid designed the locomotive class for Southern Railways, which built them between 1941-1949. No. 35028, called "Clan Line," was first con-



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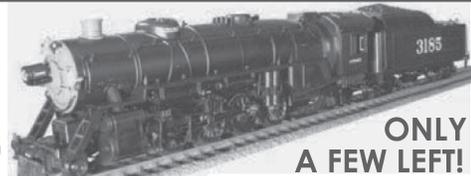


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**Spam Can:** *The Navy Merchant Class locomotive in the Swinton Yards in 1984. Copyright © P.L. Chadwick, Creative Commons Share Alike & Attribute.*

structed in 1948 and was rebuilt by British Railways in 1959. It has been preserved and is maintained at Stewarts Lane, in Battersea, London.

The 4-6-2 Pacific locomotives had a number of nicknames, including "Bulleid Pacifics," "Packets" or "Spam Cans." The prototype is almost 70-foot long and weighs in at just more than 96 tons.

Aster is represented in North America by Aster Hobby USA LLC, which is on the Web at <http://www.asterhobbyusa.com/> and at (864) 587-7999.

### Magazine to sponsor video awards

**A** contest for small-scale live steamers who made 2013 videos of their hobby efforts was announced in January by *Steam in the Garden*.

The "Steamie" awards will honor the work of live-steam videographers from throughout the 2013 cal-

endar year and be judged in four basic categories: best story video, best holiday-theme video, best instructional video and best chronicle of a steamup. Also, a grand prize will be awarded to the best overall video.

Award-winners will receive a trophy and a prize at the International Small-Scale Steamup at Diamondhead, Miss., in January 2014. The grand-prize winner will receive an Accucraft "Dora" locomotive in addition to a trophy.

"While words and pictures tell the story of the live-steam hobby well," said Scott McDonald, a co-owner of the magazine and the "Steamie" awards director, "video highlights the fun and excitement of small-scale live steaming. We want to encourage more people to make more videos so more people will get introduced to our great hobby."

Entrants will merely need to upload their three-to 7½-minute video to a sharing service such as YouTube.com or Vimeo.com, making certain to only "privately publish" the file. Then entrants will only need to fill out a short form on the magazine's web site, Steamup.com, to be entered. The last day for entry is Dec. 1, 2013.

Magazine staff will then judge the submissions and the awards will be made at the Diamondhead steamup. For more information on the video awards program, visit Steamup.com.

# DIAMONDHEAD

◆ International Small Scale Steamup ◆

JANUARY  
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2013

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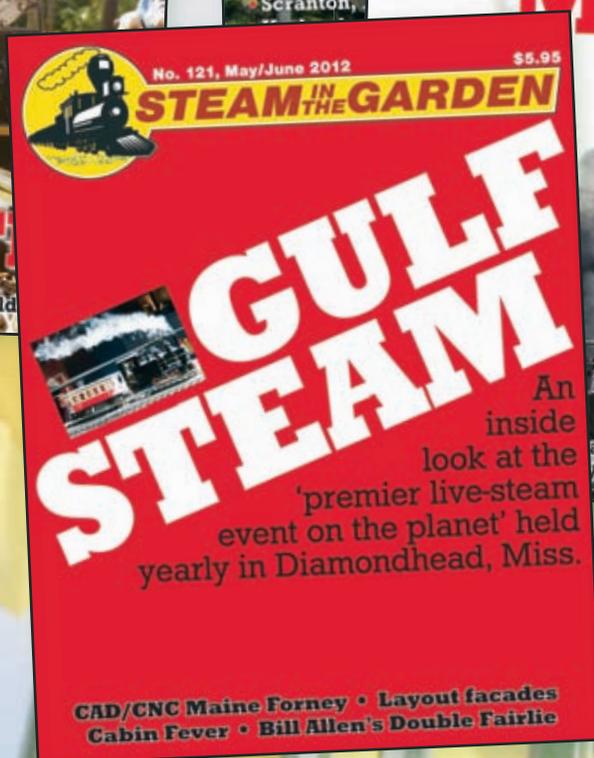
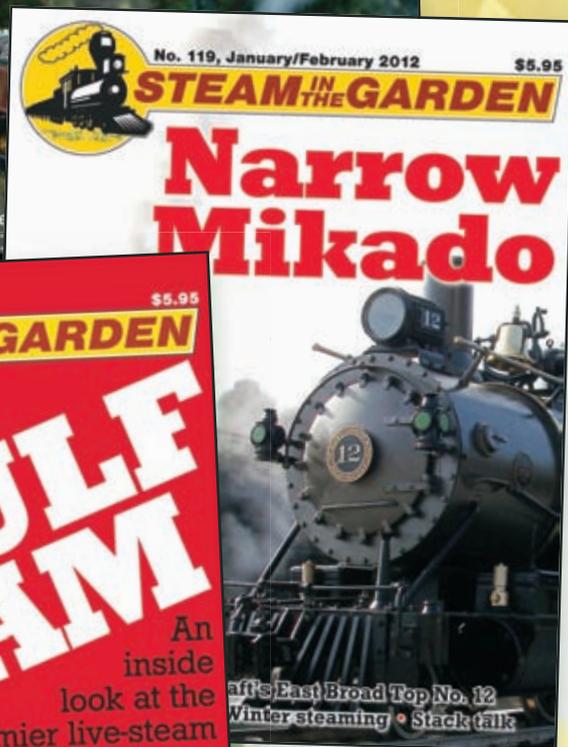
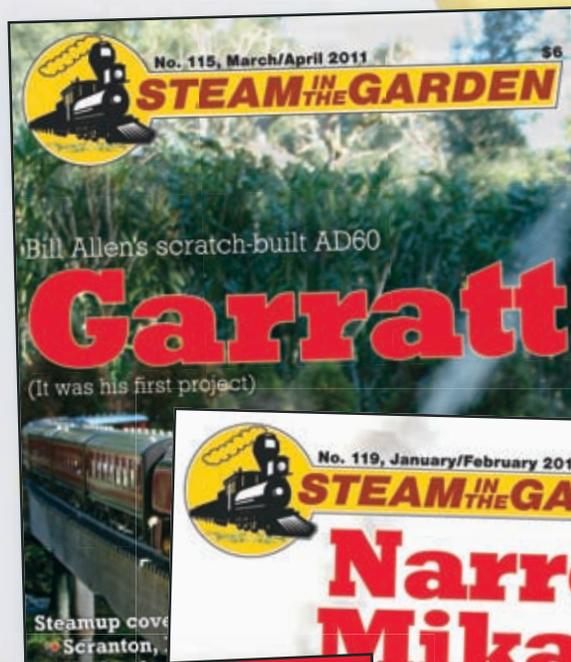
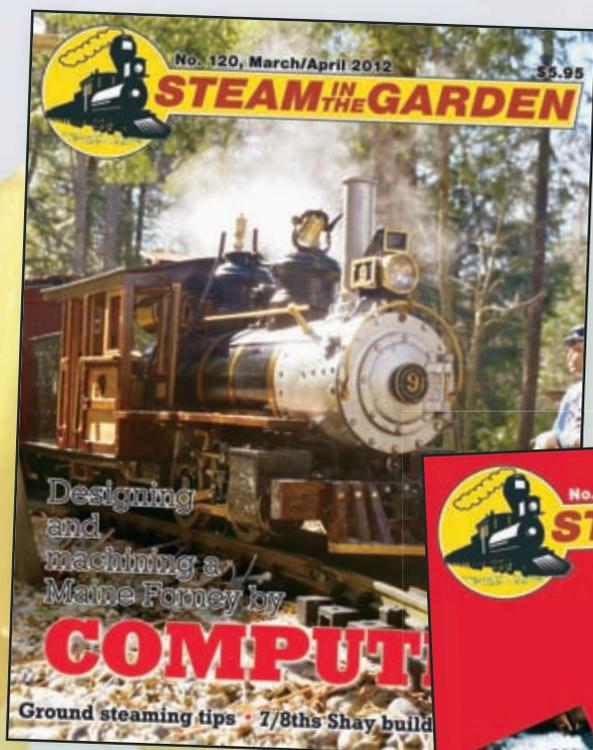


Photo by Michael Martin

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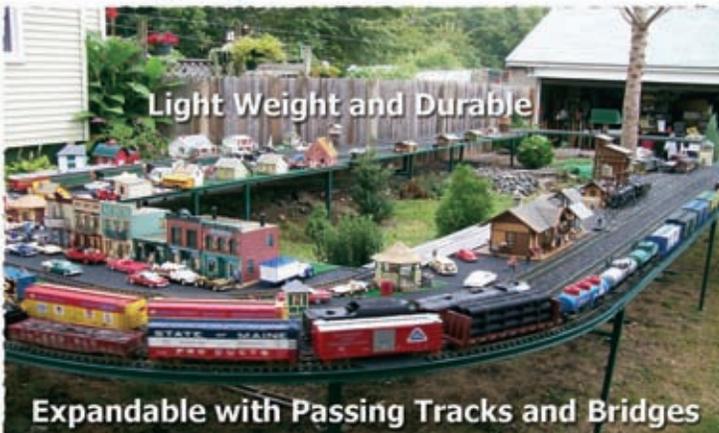
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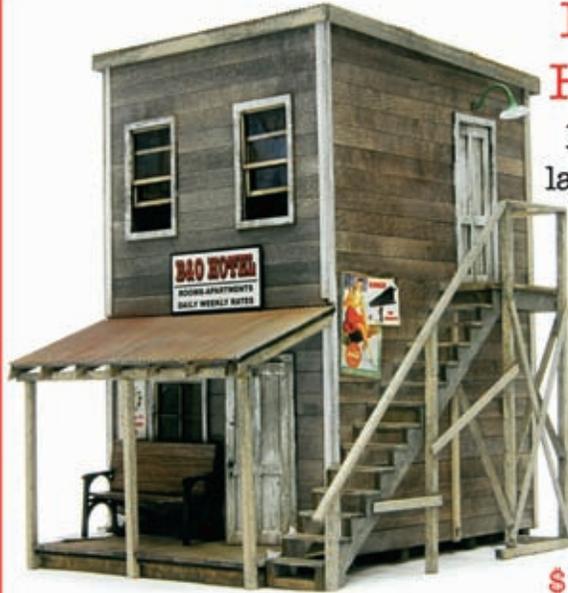
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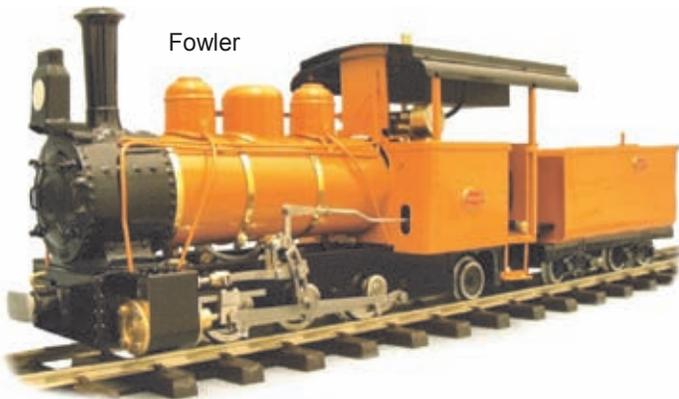
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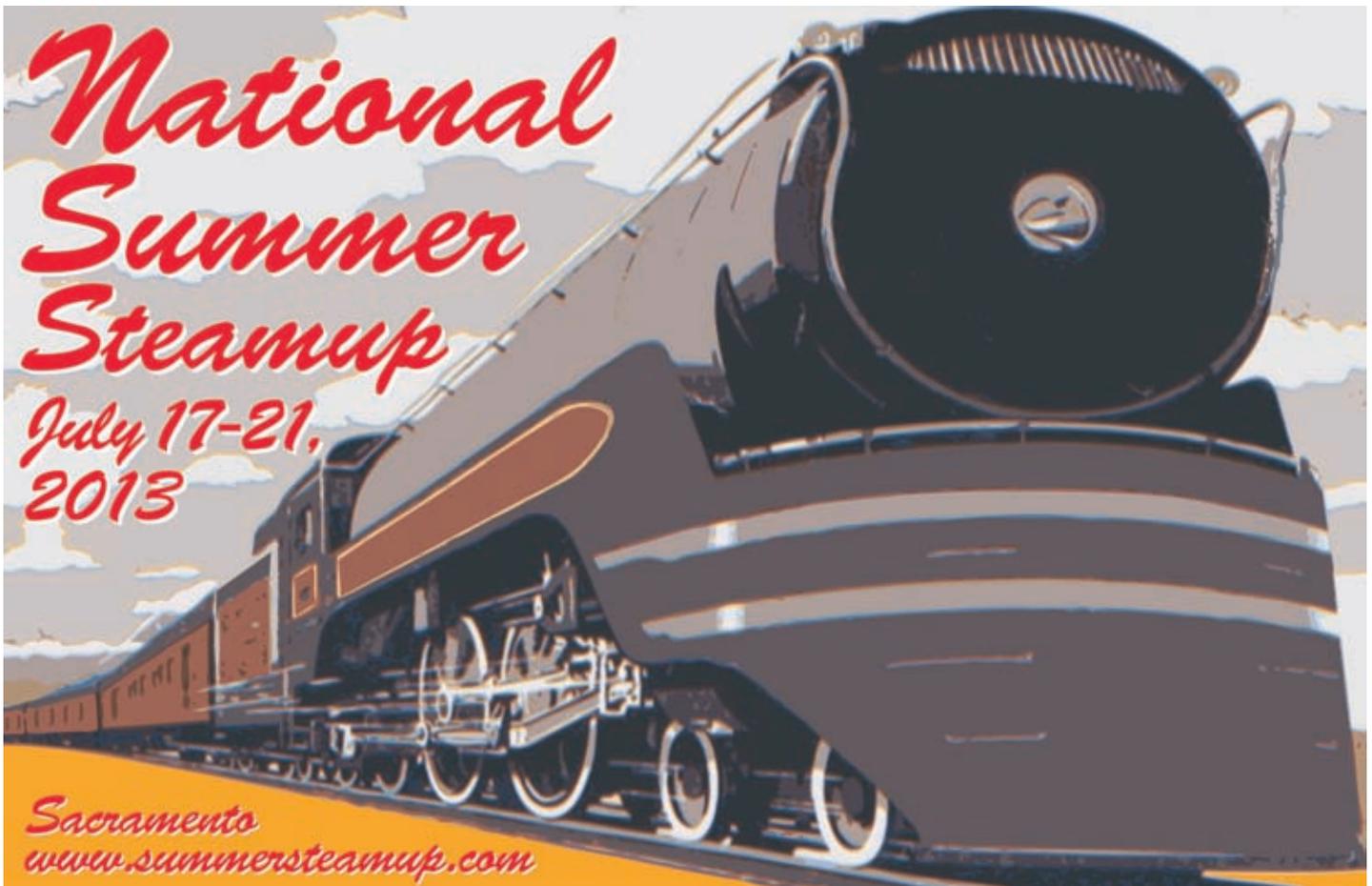


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Choosing your first

# Locomotive

Text by Scott E. McDonald

**O**ver my 25 years in the live-steam hobby, I have been an active participant in educating the general public about live steam at various venues. The patrons see a wide variety of trains of all shapes, sizes and from around the world in full steam and in some cases the view can be overwhelming with engines that look intricately technical.

Probably the most important question I get is, “If I were to get into this hobby, what would you recommend as a good starter engine?” It’s a good question, but in order to answer it faithfully, I need to know more about that person’s interest in model railroad-ing. Let’s take a look at these questions and things to think about when making that all important first purchase of a live-steam locomotive.

You may already be in the hobby and have a railway; if so, bringing live steam into an existing railway can offer up some of its own challenges. Let’s start with those who have a railway that is already set up for running track-supplied electric power. If this is where you are today, let’s take a look at some of the aspects of live steam that will impact your existing railway.

Unlike track-powered electric, grades play an important part in the operation of live steam. Many live-steam locomotives easily handle grades and others do not. The reasons for this is that your locomotive

## *Starting* IN STEAM

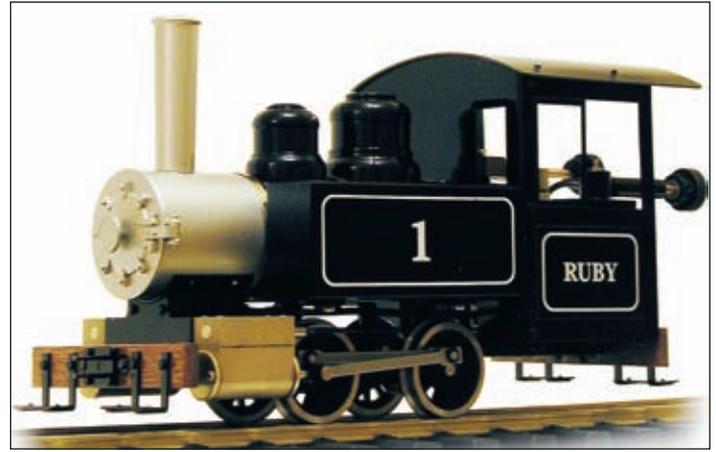
will produce steam power at a constant rate on level track, but once a grade is encountered that constant output of steam may not be enough to get over the grade. One of two things has to happen — either the throttle gets opened up to release more

steam into the cylinders to overcome the grade and/or the supply of heat to boil water has to increase to overcome the loss of steam from the boiler.

When you crest the grade and start downhill, the weight of the locomotive will assist in getting down the grade without needing a lot of steam. In many cases the steam output will stay the same but the cylinders will be moving faster than the supply of steam and are now acting like pumps, pulling steam out of the boiler. Once you reach a level grade again, your steamer may stall for a bit until the boiler fills with steam to bring the pressure back up to the level required to make the engine move.

The other aspect to consider is that your steam locomotive may have a more restrictive minimum track radius. What is the minimum-radius curve on your existing track? Will your new acquisition be able to handle the existing radius? If the locomotive that you have your heart set on requires a larger radius you might be laying new track or realigning your curves to handle the new loco.

The other thing to consider if you are coming from the track-power crowd into live steam is that



**Accucraft starters:** *Left, the new 'Dora' locomotive. Right, the O-4-0 that launched one-thousand live-steam beginners, the venerable 'Ruby.'*

live-steam engines are going to leave a mess on your track. We use lubricating oil on the moving pieces and steam oil in the cylinders that is exhausted out of the stack — both end up on your track.

Also, live-steam locos for the most part do not have insulated wheels. There are some manufacturers who do build with electrical isolation in mind, so that you can operate electric and live steam on the same track, but believe me; it is not practical because of the gunk factor.

If you plan to keep both on your railway, then plan on developing a separate loop just for live steam or be prepared to not operate steam and electric at the same time. Also, you'll want to clean your track after running steamers, so that your electrical connectivity is not compromised.

### **A steam-specific layout**

Maybe you don't already have a railway, so now you have to design and build one to support your entry into the hobby? The big question here is: do you want an on-the-ground railway or something elevated, to make it easier to have access to the controls of the locomotive? Is it going to be a scenic garden railway or do you want a utilitarian track where integration into the garden is not necessary? Answers to these questions can bring design esthetics into play in order to please all members of the family.

If your railway is going to be on the ground, then there is the bending-over factor in operation. You may want radio control for that steamer because of age, versus the ability to run on the ground. But also keep in mind that not all garden railways are on the ground; many that are built specifically for live steamers and are elevated and use a variety of gardening "tricks" to integrate the garden into the elevated design. We could devote a whole magazine issue just on that alone.

The other question deals on how much space you have. We have to consider the minimum radius that your largest locomotive will be able to negotiate. Are there larger locomotives in your future where a 12-foot radius is the bare minimum? Or are you strictly a short frame, narrow-gauge modeler who will never exceed four drivers (O-4-0, 2-4-0, O-4-2 and the like) and can get by with a three-foot radius as your minimum?

A seasoned live steamer will tell you to always build to the largest radius you have room for regardless of your motive power configuration limitations. The esthetics of a wide sweeping curve is not only visually appealing but also makes it easier for your steamer to pull longer consists.

### **More locomotive questions**

Many of us jumped into the live-steam hobby at a time when locomotive choices were limited and what was available might not have included our modeling preferences. Do you have a particular prototype or railroad that you model? Is fidelity to scale important?

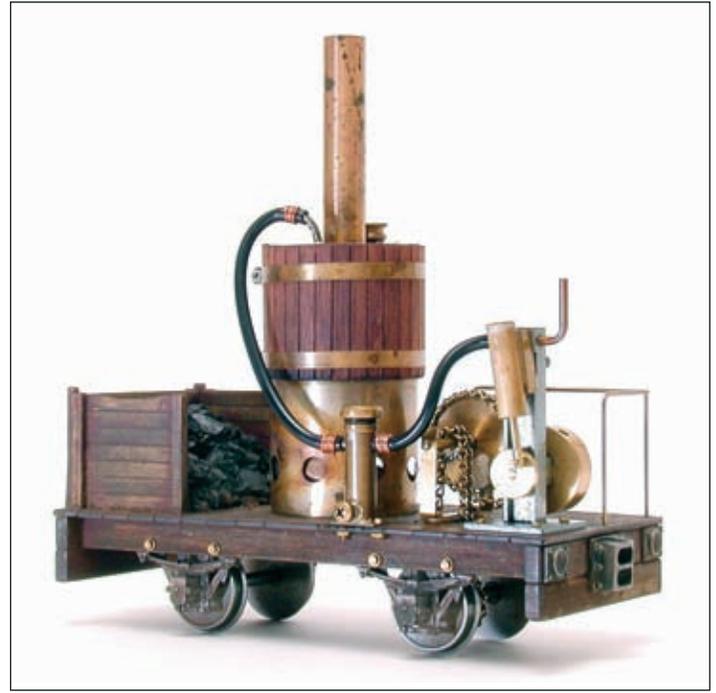
Does it have to be American, British, German or some other specific type? Are you a narrow-gauge or standard-gauge modeler? There are many more manufacturers today to select from, but before you decide, take a good look at your railway again to make sure the locomotive can handle those items in the previous questions.

The next question is one of how comfortable you are as a model builder. My first locomotive was a pre-machined kit, easy to assemble with about 40 hours of assembly time required by the instructions. It should have run perfectly, but it didn't. The kit came from Japan at a time when there were very few dealers in the United States who could offer assistance.

When it didn't run, I blamed myself for trying something that might have been outside of my



**Made in USA:** *Left, the Bellflower 'Cricket,' made in Southern California. Right, a Basic Project Engine, made in the United States if the hobbyist lives there.*



ability since I was learning from scratch about live steam. My only recourse was to ship the locomotive to Japan and have the company's technicians explore what I did wrong. I would later find out that I actually did nothing wrong, but that I had received a defective cylinder casting which was replaced and now the locomotive runs perfectly.

But there was the extra time, shipping, waiting and frustration. The lesson here is that while kits are fun and a great way to get to know your engine, if you don't have easy access to support, kit building can be frustrating.

So buying a ready to run (RTR), out-of-the-box locomotive has its merits. They have usually been tested on air and you only need to prep it for operation and fire up. But that is not to say they will always run perfect right out of the box. So purchase where you know you can get the aftermarket support if something isn't perfect out of the box.

Your personal budget will always be a big factor in your first purchase. Even the simplest locomotive in live steam may be twice or more the cost of what you were used to paying for an electric. These can be intricate mechanical devices and are usually hand built in small quantities. In some cases buying used might be more in line with your budget. "Buyer beware" means knowing who you are buying from.

I have only purchased used locomotives at a national steamup where I could test the purchase in front of the seller. Buying online for anything these days can be risky. But with a used live steamer, you never know what you will get. Don't be afraid to ask questions of the seller. If they can't answer the questions and you are new to live steam, then even

though it might look like a good buy on paper (computer screen) it might be best to skip it.

### **The Basic Project Loco**

Another way to jump into live steam is to build a locomotive from scratch, or cobble one together out of available parts. Back in 1994, Michael Martin — who was then and still today is a member of the Bay Area Garden Railway Society — embarked on creating a simple live-steam locomotive that can be built with hand tools (no machining tools are necessary) that was then called the BAGRS Project Loco (it was renamed a few years later as the Basic Project Loco). It uses a Sterno-fired, commercially available vertical boiler with easily available parts.

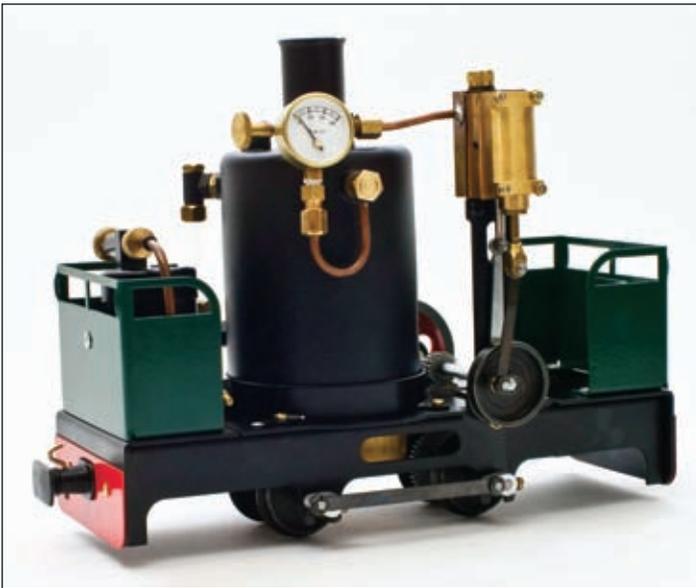
This little project was so successful that hundreds of these have been made and modified by live steamers all over the world. Mike has a web site that chronicles the history and building plans for this little live steamer. Once parts are assembled, it can be built in a single weekend.

<http://www.panyo.com/project/>.

### **Fuel considerations**

There are four basic fuels that are used for small-scale live steam: alcohol, butane, coal and Sterno. Each of these fuels has their pros and cons.

**Alcohol:** Methylated spirits or denatured alcohol are the preferred fuel for steamers. Alcohol has the benefit of being able to operate in very cold weather. Depending on the type of boiler you may also need a fan to create a draft through the fire box until you have enough steam to open the blower valve and let the locomotive fan itself. Alcohol can be messy, its



**Mamods:** Left, 'Brunel,' a gas-powered, geared loco. Right, the 'Mark II,' an updated version of the historic loco that uses gas instead of tablets.

flame may be hard to see in sunlight (which has its own inherent dangers). But fuel is inexpensive and easy to obtain at local hardware stores.

**Butane:** Becoming very popular in recent years, butane is easy to use. Most steamers prefer an isobutane which is a butane/propane mix to increase operating pressure ever so slightly for better firing. Pure propane is a fuel that is also used in some of the larger ride-on scale locomotives. There are modelers who prefer propane over butane and have scratch-built locomotives to use the fuel.

Butane and propane are not interchangeable. So if your locomotive says it uses butane that is what you will use. The down side of butane is that in colder weather it doesn't fire as well, because the cold affects butane pressure and you may get more liquid than good gas for firing (there are numerous tricks to help solve this problem).

**Coal:** Also becoming popular, but since this is an article series for the beginner, we will skip coal for now. Coal firing is not for someone starting out in the hobby; wait until you have better live-steam moxie in your veins before you jump into this. Coal firing requires constant attention, so a ground-level railway makes firing difficult, especially if your physical abilities are limited. A coal-fired locomotive boils water at a high rate, requires faster replenishment of water and the boiler design for a coal-fired locomotive increases its cost greatly.

**Sterno:** Also known as gelled fuel, this is used where a lower temperature fire will get the job done. Small, lightweight antique locomotives and scratch-built locos can run on Sterno.

## Radio control

The last consideration for your first locomotive is to decide whether or not to have radio control. There

are many locomotives on the market today where radio control can be installed as an aftermarket modification. Some models will have R/C already installed. So why have R/C?

Using R/C gives the engineer the freedom to operate more prototypically, even performing switching operations (see Page 32). If you have grades on an existing railway, then having R/C gives you the ability to control your steam to better advantage for making the grades and shutting down steam on downhill grades so that you are not pumping steam out of your boiler in waste.

However with R/C comes the knowledge of learning about your radio equipment, ensuring batteries are charged up and ready to operate and having a few more things to understand that are not totally related to making steam.

## The beginner's choice

So when it comes to choosing that first locomotive, simple is better. Find something that will negotiate your railway. If you have tight radius curves, a little 0-4-0 might be the way to go. Here are a few of the locomotives that I think fit the bill for a beginner, listed alphabetically by manufacturer.

**Accucraft:** "Dora" 0-4-0, RTR, butane fired, 1:20.3-scale freelance design, inspired by an English locomotive. As of this writing, this locomotive has not yet been released but it is expected to retail for less than \$400. <http://www.accucraft.com/>.

**Accucraft:** "Ruby" 0-4-0, available in kit form or RTR, butane fired, 1:20.3 scale. Design is based loosely on Baldwin practice; with differing details is also marketed as "Ida" and "Forney." Price range is \$500-\$750. <http://www.accucraft.com/>.

**Aster Hobby:** Does not have anything in its current offerings that could be classified as a beginning



**Regners:** Left, 'Max,' a kit-built 0-4-0; this builder kept the gel burner rather than add the optional gas burner (photo courtesy David Cracknell). Above left, the horizontal boiler 'Konrad,' and above right, the vertical boiler 'Willi.'

locomotive. A used "Old Faithful" 0-4-0, alcohol fired, double acting oscillating cylinders makes a good starter engine. However these are currently hard to find and are considered "collectable." <http://www.asterhobbyusa.com/>.

**Basic Project Engine:** See above; average price for all the bits and pieces to build \$250-\$325. See <http://www.panyo.com/project/> for parts list and plans.

**Bellflower Locomotive Works:** "Cricket" RTR, only live steam locomotive made entirely in the United States, geared locomotive, single vertical cylinder, butane fired. Price is around \$850. <http://www.cricketlivesteammotor.com/>.

**Mamod:** "Brunel" 0-4-0, RTR, geared locomotive, single cylinder, horizontal boiler, butane fired, gear drive. Price is around \$650. <http://www.mamod.co.uk/>.

**Mamod:** Mark II 0-4-0, freelance British outline. Older engines are easy to find, but may need work to turn them into a quality steamer. The newer Mamods now have better boilers, are butane fired and are available in 32mm or 45mm gauge (not adjustable). About \$550. <http://www.mamod.co.uk/>.

**Regner:** "Konrad" or "Willi" 0-4-0, RTR, geared locomotive, single cylinder, butane fired. "Konrad" is a horizontal boiler; "Willi" is a vertical boiler. Gauge is adjustable from 32mm to 45mm. Price is around \$700. <http://www.thetraindepartment.com/>.

**Regner:** "Max" 0-4-0, kit, geared locomotive, single cylinder, gel or butane fired, vertical boiler. Gauge is adjustable from 32mm to 45mm. Price range is \$350-\$500. <http://www.thetraindepartment.com/>.

**Roundhouse Engineering:** "Billy," 0-4-0 kit, butane fired, freelance scale, two cylinders. Available as three discrete projects (boiler, chassis and cab and details), allowing modeler to avoid a single up-front payment. About \$1150. <http://www.roundhouse-eng.com/>.



**Roundhouses:** Above, 'Billy,' comes as a three-stage kit allowing the hobbyist to make incremental payments. Below, 'Sammie,' an almost-American locomotive.



**Roundhouse Engineering:** "Sammie" 0-4-0 RTR, butane fired, two cylinders, freelance scale and an almost-American profile. Available in 32mm or 45mm gauge (not adjustable). Price is around \$750. <http://www.roundhouse-eng.com/>.

Obviously, these are general guidelines, but understand that small-scale live steam is a hobby that provides the beginner with plenty of choices and if you break them down, the answers become easy.

Mysteries of a crucial steamer component explained

# VALVES

Text by Bill Allen; drawings by Dennis Mead

**I**n my short time as a live-steam scratch builder, I have had to learn a lot about the internal workings of the steam locomotive. My 20 years as an auto mechanic made the technical problems somewhat easy to grasp, however I struggled in the area of valve design. I have read much on the subject in several publications but found that they all seem to be missing some ingredient to tie everything together. Perhaps that is because the author assumed prior knowledge of certain aspects of the workings of the locomotive engine.

I decided to try to help both scratch builders and those who just want to know how their engines operate and will try to cover all of the basics and then progress to more complex designs.

## The simple steam engine

The basics of a rod-driven locomotive with horizontal cylinders are fairly simple. We will refer to the furthestmost forward position of the piston as front dead center (FDC) and its opposite as rear dead center (RDC). Most steam cylinders have a power stroke in both directions, so the front or rear are not that important (references to FDC could just as easily be RDC).

Here is how the engine works:

## Starting IN STEAM

Pressurized steam is admitted into the front of the cylinder through a port when the piston is at or near FDC. The port at RDC is now open to exhaust. The steam forces the piston toward the RDC position and the piston forces the exhaust out the rear port.

At or near RDC, the front port closes to steam and opens to exhaust and the rear port opens to steam and forces the piston forward.

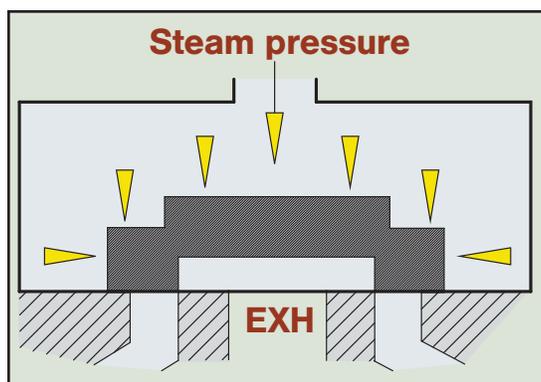
The ports are opened and closed by a valve that slides back and forth, covering or uncovering the ports.

There are two types of valves commonly used. The sliding, or “D” valve, and the piston, or spool valve. The “D” valve gets its name because it resembles the letter “D” laid on its side.

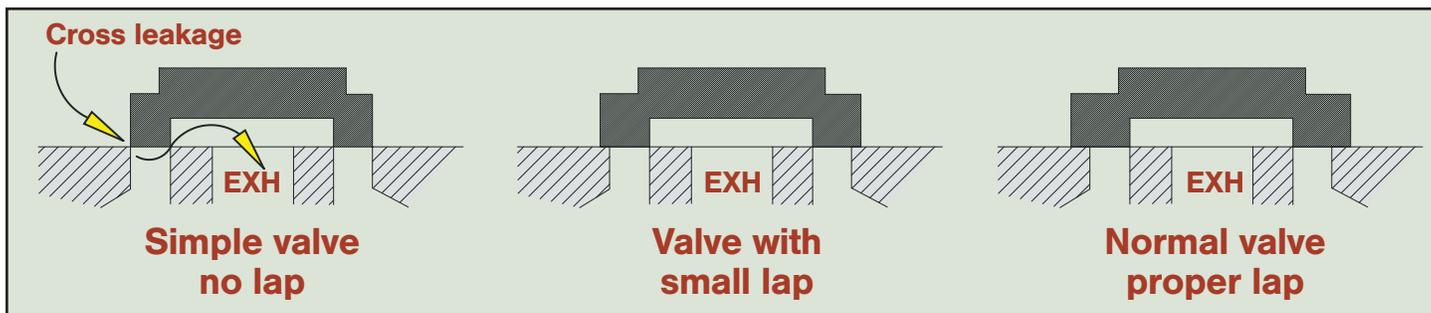
When the “D” valve is used, the steam pressure (admission) must be on the outside of the valve.

As illustrated to the left, if the pressure was in the inside port, marked “EXH,” it would lift the valve off the seat and the engine would not run. The piston valve will work equally well with inside or outside admission but is usually set up with inside admission.

The valve is operated by the valve gear, which is 90-degrees out of phase with the piston. In other words, when the piston is at FDC or RDC and the wheel crank pin is horizontal to the cylinder, the valve lever



**'D' slide valve:** The diagram shows outside admission; 'EXH' is exhaust.



or eccentric center line is in a vertical position and the valve is at center position.

In this position, the port will be opened with the slightest rotation of the drive wheel. As the valve crank is at a vertical position, the slightest rotation of the wheel will move the valve, whereas the piston crank is at the horizontal position and wheel rotation will move the piston rod in a more up and down position with little forward or backward motion.

The valve is normally moved back and forth by an eccentric, which is a round disk with an off-center hole drilled through it and is attached to an axle between the frames. Outside valve gear usually have a crank that is attached to the wheel crank pin at an angle that will make its center line perpendicular to the cylinder center line. This is referred to as the eccentric or return crank.

As you can see on the left of the above illustration, the legs of the “D” are the same width as the port so the slightest movement opens the steam on one side and the exhaust on the other side. This setup works well in toy or small engines but has some drawbacks as we look to pull heavier loads:

- The edge-to-edge sealing surface of the valve will allow steam to escape to the exhaust port (blow by).

- This is extremely wasteful as each port is open to steam or exhaust at any given time.

- The steam admission through the full stroke of the piston creates additional

**Valve lap:** *The amount of lap determines the cutoff. Normal lap is from 50-100 percent of the port size. Our models are usually in the 60-percent range.*

exhaust back pressure.

In the simple engine, steam is admitted into the cylinder throughout the whole piston stroke. The

valve then opens to exhaust so that one valve is always open. This is a very inefficient way to operate as steam (or any gas under pressure), will continue to expand after the supply is shut off.

Think of an air tank being filled by an air compressor. When the compressor shuts off, the tank still has the air pressure necessary to do the job and will normally continue to do this for a while. As the air is expanded out from the tank, the pressure goes down but continues to do the job.

If we cut the steam off in our cylinder before the piston reaches RDC the pressure in the cylinder will continue to drive the piston rearward without using any steam from the boiler. This will result in more efficient running.

There is an added benefit that only the volume of steam that was present at cutoff needs to be exhausted. This reduces exhaust back-pressure, which is one of the major factors of poor performance and rough running at slow speed. So with proper cutoff, you get more power, smoother running and use less steam. It should be noted that in small,

### Walschaert or Walschaerts?

**M**any confuse the difference between the gearing — called Walschaert — and the man who invented it, Egide Walschaerts.

According to a 1920 book, “The Walschaert and Other Modern Radial Valve Gears for Locomotives,” Egide Walschaerts was a foreman and master mechanic with the Belgian State Railways in 1844. “Dissatisfied with the results obtained from the use of two eccentrics in governing the motion of one main valve,” writes author William Wallace Wood, Walschaerts designed a better valve gear.

But because of a rule with the Belgian railroad foremen could not make a personal profit from an invention and Walschaerts couldn’t patent his own device.

A friend applied for an 1848 patent and to legally blur the distinction between the inventor and the invention, dropped the final “s” from Walschaerts’ name in the patent filing.

Despite the ruse in patenting the gearing, Walschaerts himself received acknowledgement of his invention, receiving gold medals at the 1878 Paris Exposition and the 1883 Antwerp Exposition.

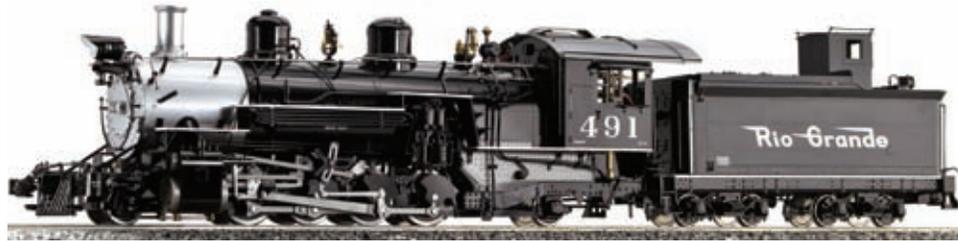
A copy of the 1920 book was scanned by Google Inc. as part of its Google Books project from a copy in the Stanford University Library; it can be easily downloaded for free for desktop or e-book reader.

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non-superheated engines, the benefit of expansion can be negated by condensation caused by the cooling of the expanding steam.

### Lap and lead

In order to have the proper cutoff, admission needs to be shut off at the predetermined point in the piston stroke (usually 75 percent-85 percent of the piston travel) while the exhaust port on the opposite side of the piston remains open.

To make this happen, the steam admission side of the valve is made longer so it overlaps the port causing that side of the valve to close sooner; this is referred to as lap. The examples on Pages 28 and 29 show the valve overlapping the steam admission ports so that the slightest movement of the valve will open the exhaust port but not the admission port. Having lap also prevents blow-by as there is a greater valve surface covering the admission side at any given time.

Lead is the amount the valve is open to steam while the cylinder is at FDC/RDC. If you have ever fooled around with cars, you probably know that an automotive engine has advanced timing; the spark plug fires before the piston reaches top dead center.

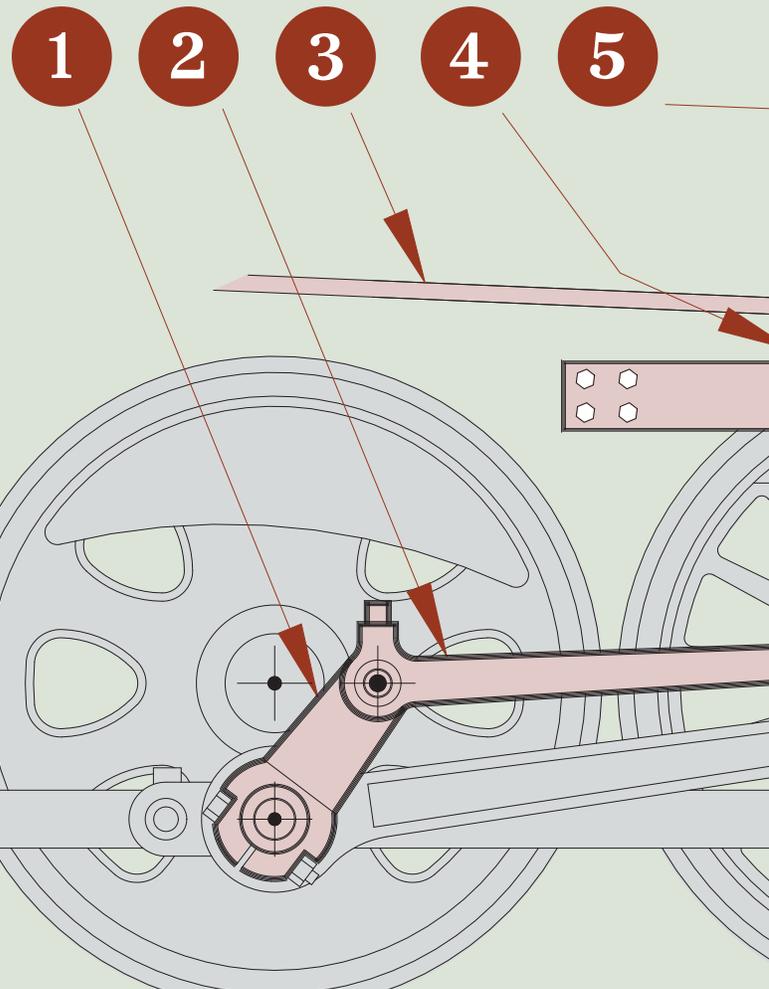
This is done to compensate for the time lag between spark and combustion expansion and is essential to smooth running and acceleration. A steam engine will also benefit from advanced timing which is measured by the amount of lead that is present at FDC. The amount of lead in our small engines is usually only .004-inch to .006-inch in valve movement.

The locomotives from Accucraft Trains Co. of Union City, Calif., that are based on the “Ruby” are an example of a simple engine with lap. Because the “Ruby” has piston valves, which work equally well with either inside or outside admission, the direction can be changed by simply reversing the admission from inside to outside. This is accomplished by an additional valve located between the two cylinders.

When admission is reversed, the valve timing is also reversed. As such, the valve lap needs to be symmetrical and cover both the admission and exhaust sides equally. This provides some cutoff and prevents blow-by, but also retards the timing or gives it negative lead. The boiler produces plenty of steam and it runs wonderfully at fast speeds. Because of the retarding of the admission, it is a little rough at slow speed. Also because of a design quirk, it runs better on inside admission.

# Walschaert valve gear

The key components



If we wish to pull large loads or are looking for smoother running we will usually move to more complex valve systems

What is commonly referred to as “modern steam engine design” is construction which enables the four cycles in a steam engine, which include admission, expansion, compression and exhaust.

Compression occurs when the valves are closed to admission and exhaust and starts just prior to FDC and ends just after FDC. It slows the piston down only slightly before FDC as steam is still expanding from the previous cycle and gives it a boost after FDC. Compression can be felt when pushing an engine with piston valves but not normally with “D” or slide valves because they need steam pressure to properly seal.

### Putting it all together

So here is how the events should happen:

- Slightly before FDC, the valve opens to admission. The cylinder is slightly charged from the compression. At the same time the RDC port is opened to exhaust. As steam continues to be admitted, the pressure in the cylinder rises and slightly after FDC, approaches the boiler pressure. The percentage of

boiler pressure depends on the load, throttle setting, speed, port size and other factors

- The admission drives the piston rearward until about 80 percent of its travel where the steam is cut off and expansion begins. The RDC valve remains open to exhaust.

- At about 95 percent of piston travel, the RDC valve closes to exhaust and compression begins.

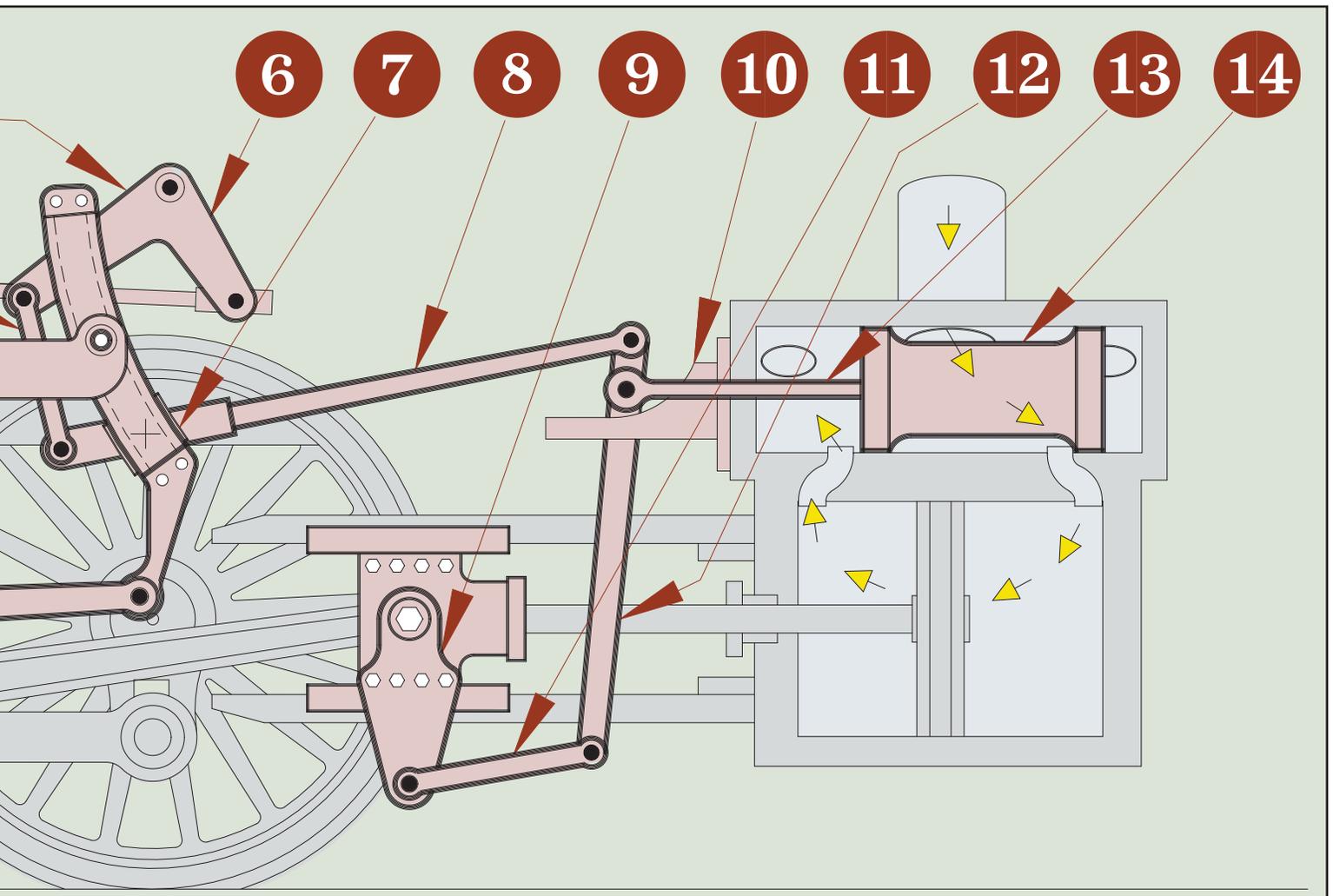
- At RDC the valve opens to exhaust and the cycle (one-four) begins for the RDC stroke.

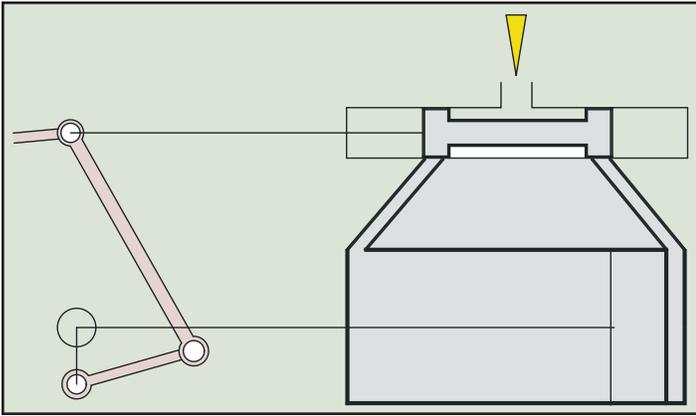
- At the same time, on the other side of the engine, the wheels are being driven in the same way except that they are 90 degrees out of phase so that instead of having two power strokes per revolution, we have four which are separated by 90 degrees each.

Since no full-size steam locomotives have been built in many years, most of the research on them

### Walschaert valve gear — the key components:

1. Return crank.
2. Return link.
3. Reach rod.
4. Lifting link.
5. Lifting arm.
6. Reverse arm.
7. Expansion link.
8. Radius bar.
9. Cross head arm.
10. Valve stem guide.
11. Union link.
12. Combination lever.
13. Valve stem.
14. Piston valve.





**Faux Walschaert combination lever:** *The lap covers the ports when the piston is at FDC. The combo lever moves back and forth, but does nothing.*

was produced before the computer age, and many of the descriptions contain extensive formulas requiring, at the very least, a thorough knowledge of algebra and trigonometry.

Pretty much all of the modern works on the subject are done by modelers, mostly the ride-on guys. There is a great program on the web by Charles Dockstader at <http://www.billp.org/Dockstader/ValveGear.html> (or just search for the word Dockstader). The novice can peruse the various valve systems at the site to see how they work and the scratch builder can put planned dimensions into the program to make sure everything is correct. You can watch an animation of the engine in action. You can review graphs which would have taken hours to plot in the old days.

I recently did this to check the Walschaert gearing plan for my current project and was happy with the results. When you open the type of gear you want to see, make sure you try all of the buttons at the top to see what you can do with the program.

## Modern valve gear

The most popular and widely used valve gear in the 19th century was designed by the Stephenson Locomotive Works — which was founded by the former British engineer George Stephenson and his son Robert — and it was used up until the turn of the century when the Walschaert gear took over as the most widely used.

The Stephenson gear, in its pure form, uses two eccentrics per cylinder, one for forward and one for backward running. A lever which is attached to the Johnson bar in the cab switches the valve linkage back and forth from the forward to the reverse eccentrics

The Walschaert valve gear is a type of valve gear invented by Belgian railway mechanical engineer Egide Walschaerts in 1844 (see sidebar).

The Stephenson valve gear was the most commonly used valve gear on 19th-century locomotives. However,

the Walschaert valve gear had the advantage that it could be mounted entirely on the outside of the locomotives, leaving the space between the frames clear. This resulted in it being adopted in some articulated locomotives including the Uintah. Although it was slow to be accepted, it became the most popular gear in the 20th century all the way up to the end of the Steam Era.

The Walschaert gear is what I am using in my latest project because I want to keep it prototypical for the Uintah 2-6-6-2 that I'm building, which has inside admission piston valves. There are pros and cons to using piston valves that I had to consider; they are:

- They say that a slide valve wears in but a piston valve wears out. This is true to a certain extent except that the slide valve has constant steam pressure forcing it down on the seat which accelerates wear. Advantage: neither; if kept oiled, they will both probably outlast their owner.

- The slide valve puts more strain in the valve gear and radio control is difficult if not impossible because of the extra drag. Advantage: Piston valve.

- Slide valves are easier to make and they seal better than piston valves. Advantage: Slide valve.

- Piston valve is prototypical and will use the proper combination lever and return crank orientation. Advantage: Piston valve.

I decided that staying prototypical was advantageous, so all of the illustrations will be for piston valves. Everything would be the same for slide valves, except that it is reversed because the admission is reversed.

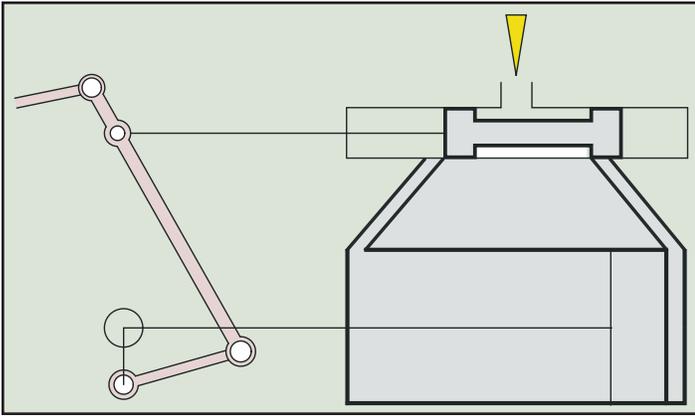
## Walschaert gear components

**Eccentric crank:** The valve gear starts with the eccentric crank. It is usually attached to the drive wheel crank and rotated around so that the center line is perpendicular to the cylinder center line. The crank is machined so that the exact distance between the axle hole and the link hole will produce the desired valve travel when it is at 90 degrees to the cylinder center line.

As this creates a right triangle the measurement is easily determined by using the Pythagorean Theorem (from high school geometry). Unlike a round eccentric, the crank cannot be rotated to advance or retard the timing without changing the valve travel so once it is set, you are done.

**Expansion link:** The crescent-shaped link you see between the wheel and the cylinder is called the expansion link. This link pivots near its center and is connected at the bottom to the eccentric crank by a return link. In the center of the Expansion link is a sliding block that is connected to another link called the radius rod.

This rod is lifted and lowered by linkages connected to the Johnson bar and reverses direction in



**Working Walschaert combination lever:** *The valve moves to the right a distance equal to the lap plus lead. The front port slightly open at FDC, while the rear port is open to exhaust.*

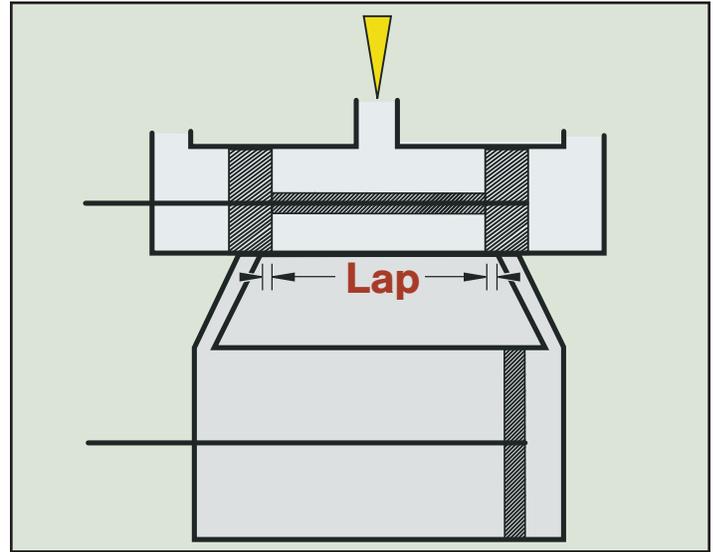
this way: when the radius rod is in the fully lowered position, it moves in union with the return link. But, when the rod is raised, it now passes the pivot point of the expansion link and then moves in an opposite direction to the return link causing the engine to run in reverse. The expansion link has the added advantage of being able to increase the point of cutoff by operating at less than full gear. This position of the Johnson Bar was often called the “company notch.”

**Combination lever:** Really the heart of the Walschaert valve gear is the combination lever, without which the valve will just move forward and backward in direct relation to the circular travel of the eccentric. As a result of this, when the piston is at FDC, the valve with lap is covering the port and needs to move up to half its forward travel to overcome the lap and uncover the port. If we want the engine to have any lead, we need to move it even further.

The combination lever does this for us. The lever is connected to the cross head with the union link and then to the valve stem and the radius rod thus connecting the valve stem to the radius rod. The valve and radius rod are not connected at the same pivot point but at two points very close to each other which creates a leverage between the long lower part of the combination lever and the short distance between the pivot points of about 10-to-one.

As the lever is connected to the piston rod or cross head, it is 90-degrees out of phase with the valve and in phase with the piston. True to its name, the lever combines the piston and eccentric movement into one combined valve movement. When the valve is in the center position, the piston is at FDC where the combination exerts maximum movement on the valve. When the piston is in the middle of the power stroke and the valve is fully open, the combination lever effect is zero.

The movement of the combination lever needs to



**‘Ruby’-type cylinder with lap:** *The admission port will open slightly after FDC and will close the same distance from RDC. The light blue are shown here is the steam or admission side, but this can be reversed to the outside by the reversing valve.*

be two times the lap plus the lead. If we have a valve with a lap of .045-inch and we wish to have .005-inch of lead then the combination lever needs to move the valve off center at FDC by .050-inch and another .050-inch at RDC for a total movement of .100-inch. Assuming a one-inch stroke, the combination lever needs to have a 10-to-1 ratio to accomplish this.

The placement of the links at the two upper combination lever holes is different for “D” valves as they are reversed but the ratio is effectively the same.

Some models have most of the Walschaert components but are missing the combination lever. Others have a faux combination lever that does not have the two holes at the top as in the illustration. On an inside-admission engine, the radius rod is above the valve push rod and on an outside admission engine it is below the push rod.

With the faux combination lever (or no combination lever), the valve is at the center with the lap covering both ports when the piston is at FDC. The illustration shows a faux lever, which some models have, where the radius rod and valve stem are connected at the same point. The combination lever moves back and forth but does nothing.

The working combination lever has moved the valve to the right a total distance equal to the lap plus the lead and the front port is now slightly open to admission when the piston is at FDC. The rear port is now open to exhaust.

Hopefully, I have cleared up some of the mystery surrounding the subject and you can expand your knowledge even further by reviewing many of the valve animations and articles found on the Web.

Converting Accucraft 1:20.3-scale flat cars to

# 7/8 CARS

Text & photos by Dave Frediani

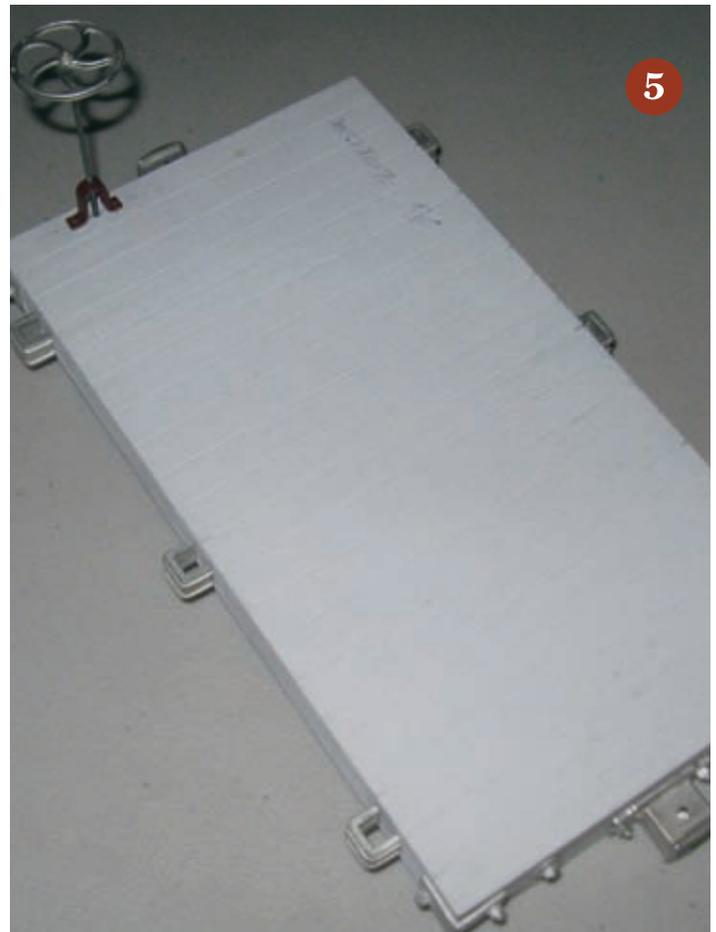
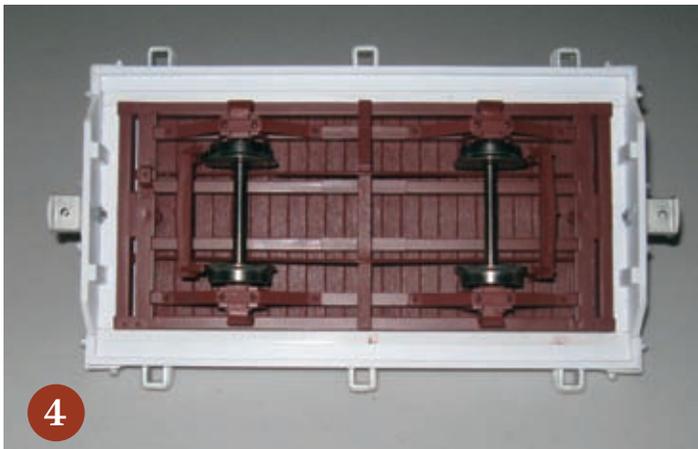


**I**t was only after ordering my 1:13.7-scale “Emma” locomotive from Accucraft Trains that I realized the company doesn’t offer any 1:13.7-scale rolling stock. After doing some research and finding the dimensions for a 1:13.7 (aka “7/8ths scale”) flat car — and not wanting to spend a lot of money on running gear — I decided to use the Accucraft two-axle 1:20.3-scale flat car as the basis for a my new rolling stock.

Using the needed wheels, trucks, brake arms and framing, I then removed the stake pockets and couplers from the Accucraft flat car and brake wheel and stand.

**1** Taking the dimension for a 1:13.7-scale flat car —  $4\frac{3}{16}$ -inches wide by  $8\frac{1}{16}$ -inches long — use a sheet of one-eighth-inch styrene cut to the above measurements. Form the frame out of two No. 189 strips of Evergreen styrene, placing one strip above the other. Then on the inside of the frame work, I used No. 255 square tubing and No. 169 strip, also Evergreen styrene, to form the spacing that is needed to allow the flat car to fit snugly inside the new frame work of the larger car.

**2** Using a hobby knife, scribe the base to desired plank width.



**Complete:** *A box car conversion.*

- 3** Drag a hack-saw blade over all the external styrene to simulate wood grain, then lightly sand.
- 4** I used two No. 189 strips to form the end beams. Then, using Ozark Miniature couplers No. 4018, I added stake pockets No. 4001, three per side, four frame corners No. 4041 and truss rod nut and washers No. 4023 for end beams.
- 5** To reattach the brake wheel stand, drill two 1/16-inch holes through the existing holes on the brake stand into the deck and then secure with cyanoacrylate adhesive (Super Glue). Also drill a

1/16-inch hole through the center of the stand into the deck for the brake wheel shaft. The shaft should be 1/16-inch round stock and 2<sup>3</sup>/<sub>4</sub>-inches long and use Ozark Miniature No. 4035 Brake Wheel. Drill a 1/16-inch hole into the bottom of the wheel and attach to the shaft.

I have used this method to build box cars, tank cars and a caboose all using the two-axle Accucraft flat car. You have to be consistent with the inside dimensions at 3<sup>5</sup>/<sub>16</sub>-inch wide and 7<sup>7</sup>/<sub>8</sub>-inch long. You can build several cars using one Accucraft flat car as the base and be able to change to the style of the car as desired.

## Steam scene



This hobbyist wanted his backyard to be a realistic miniature world and modified his layout and locomotives for scheduled live-steam

# Operations

Text & photos by Jack Verducci

**O**ne of the first things that grabbed my attention when I began in garden railroading in 1988 was live steam. I first saw live steam run on the Great Circle portable layout in front of the Rara Avis train store in Concord, Calif. (now called Just Trains).

At that time, live-steam engines were mostly foreign prototypes or expensive U.S.-type locomotives. I originally did not run live steam believing it couldn't handle my grades, that it needed to be run on elevated track and there were no American prototypes. So, for those reasons, I thought live steam couldn't run on my garden railroad with its steep grades and tight-radius curves.

Around 1995 I was introduced to the Sandy River & Rangeley Lakes Railroad No. 24, a Prairie-type locomotive built by Roundhouse Engineering Co. Ltd., of Doncaster, England. This was the beginning of the

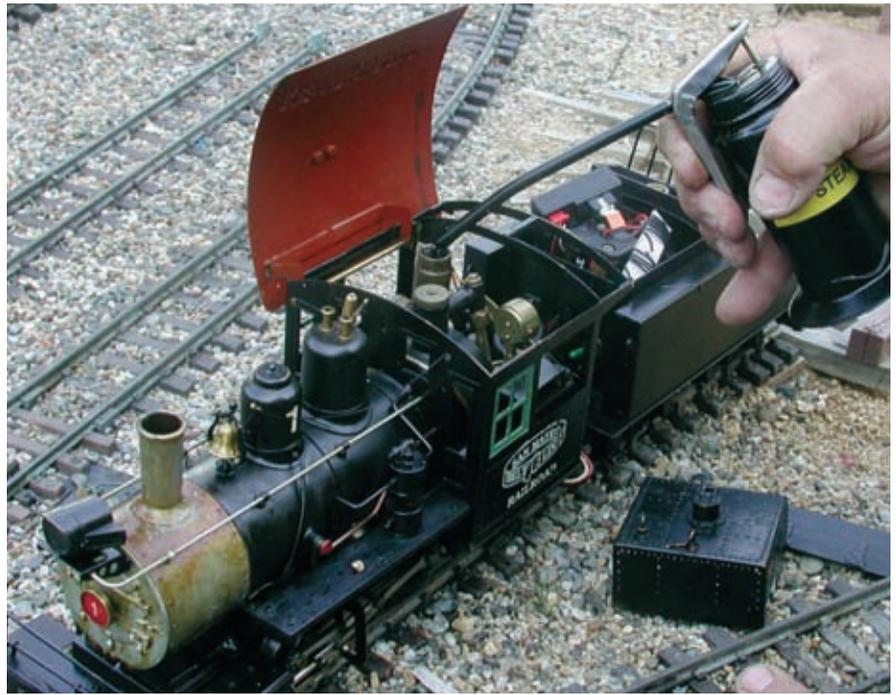
end of electric trains on my layout — I discovered that I could run live steam on my garden railroad. Radio control is the one thing that made this possible. The ability to throttle back going down hill is a big deal.

Over the years I used live steam to work toward a goal of creating a realistic miniature world that ran real steam over real dirt through real trees and up whatever grades there may be. In addition to this, I wanted to incorporate railroad operations, with freight and passenger traffic including switching.

To achieve real railroad operations in small-scale live steam, I had come up with several variations and methods to keep the locomotives in steam all day long. The big three are:

- **Water:** Using Goodall valves and a pressurized distilled-water delivery system, I am able to water an engine, under steam, in seconds.

- **Fuel:** I added, when needed, larger fuel tanks



**Miniature world:** *Opposite page, a pair of modified Accucraft C16s double-head up the Crystal Springs Railroad's grade. Upper left, oversized gas tanks were fitted in some locos. Upper right, a large oil reservoir is filled with a pump-type oil can. Lower right, an operator's pit was sunk in the yard to allow for easy servicing; here, the pressurized distilled-water system is used.*



and water baths to facilitate longer run time.

- **Steam oil:** I added, when needed, larger steam oil reservoirs.

Each engine is run on a schedule. This differs slightly between locomotives but basically every 10 minutes water is added and every 20 to 30 minutes water and fuel are topped off. Steam oil is checked every 45-60 minutes, depending on the locomotive.

This prevents engines from running out of gas or water in the middle of the mainline causing a traffic jam. Good old squirt bottles are kept on hand to top off water if an engine needs water and is not close to a service facility.

To solve the on-the-ground problem, I came up with three service areas where the engines are easier to reach. One area was a natural: at the retaining wall at the bottom of my hillside. Here trains are at waist height or better.

The second area is a slight raised area in my front

yard and the third (and my favorite) is my operator's pit. This is basically a cement-lined hole in the patio. Instead of raising the railroad, I lowered the operator.

## Operations

Basically I wanted my railroad to have a purpose and tell a story about railroad operations. It starts with an order from my wood products company for lumber. The order goes to Crystal Springs Lumber Co., which sends one of its log trains up to the landing to pick up logs, which are then delivered to the mill for processing. The cut lumber is set out on a siding.

A card is made up for each lumber car indicating where it needs to go. The card is given to the local yard master. When the next train arrives, the card is given to the engineer who will pick up the cars and deliver them to the indicated destination. To make it interesting there is other freight mixed in; there could be oil tank cars going to the log landing,



**Operations:** Upper left, steamer adds fuel at bottom of layout, where retaining wall allows for steamup bay. Upper right, a full complement of locos under steam in the roundhouse. Middle right, an antique telephone used for dispatch calls. Lower right, a way bill next to its car. Lower left, dispatcher is at a central location; inset, the board is a map of the system and trains are tracked using magnetic symbols.

machinery going to the shipping docks or machine-shop and a variety of other mixed freight.

- **The social aspect:** I can run a single engine around the layout and have fun doing it, but I really enjoy full operations. This involves several people and becomes a social event. To run full operations it takes seven to 10 people.

- **Engineers:** One engineer for each train. We can run four trains; more becomes a traffic problem.

- **Dispatcher:** We have a dispatcher who controls where the trains can go on the mainline. I have a

single track mainline with four passing sidings and two reversing loops, so it takes some coordination to prevent head-on wrecks.

- **Yard masters:** Each of the three major yards have a master to control the freight traffic in and out and to act as a hostler to fuel and water the locomotive.

- **Switch engines:** Then as an option we can run switch engines at each yard to make up trains.

The whole purpose of this is to have fun running trains. There are times where we just run trains.

A resonator that adds depth as well as volume

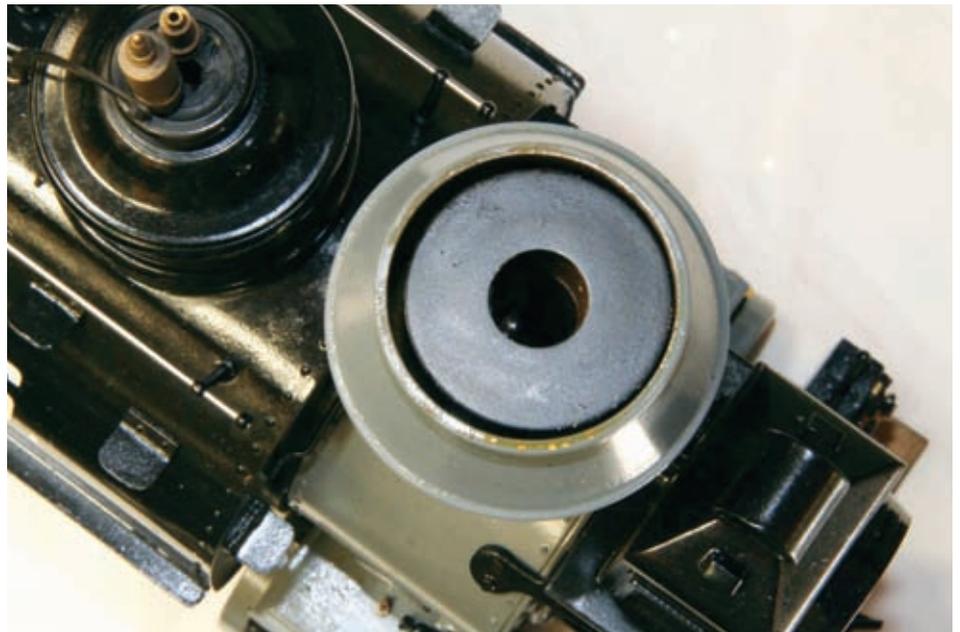
# Diamond IN THE CHUFFER

Text & drawings by Rob Lenicheck; photos & design by Dennis Mead

**T**here has been a movement over the last few years in the small-scale live steam hobby to alter the exhaust sounds from our engines, hoping to make them sound more like the real thing. Some of these designs do work quite well, while others leave a bit to be desired.

One day while running my scratch-built Rio Grande Southern No. 14 tank engine, I mentioned to Dennis Mead that none of the chuff pipes I had made for that engine were satisfactory to my ear. They all seemed too “tinny” and without any depth to the sound. The engine has a rather large exhaust port which, I think, makes it more difficult to use traditional chuffers.

Dennis, a local friend of mine and a very creative and original guy who has been mentioned several times in articles by Bill Allen, proposed to me that he might be able to come up with a design which would alter the sound rather than trying to make it louder. His primary goal was to give the sound a deeper quality and let the amplification take a lesser role. And, as an additional plus, since the exhaust is vented higher

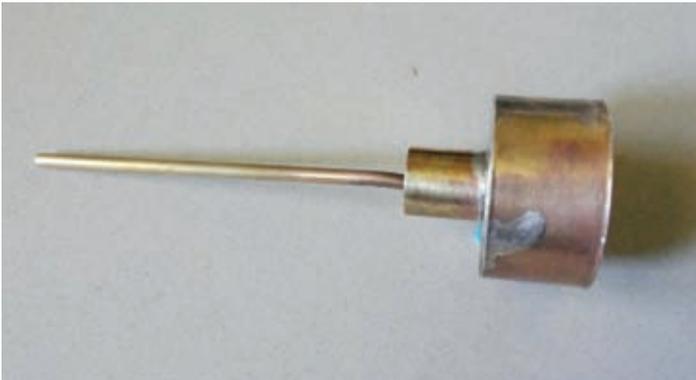
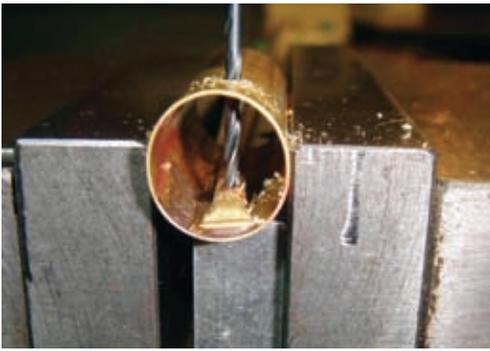


**In the diamond:** Chuffer placed in stack of the author's RGS No. 14

in the stack the design provides a better steam plume.

Because of the way it is designed it will only work in diamond stacks and the like, since all the chuff sound alteration happens within the “diamond” area. Obviously, if the opening at the top of your stack is less than the proposed 1.375-inch diameter of the resonator, then you must adapt the size accordingly.

When complete, the assembly simply slips inside



**Chuffer construction:** *Top left and middle, concentric holes are guaranteed by drilling after assembly. Top right and bottom left, assembled resonator. Opposite page, CAD drawing of resonator.*

and it reacts with the larger, 0.094-inch diameter hole just opposite it in the side of the resonator. It is important to include the 0.030-inch diameter condensate hole at the bottom of the resonator, as in Larry Bangham's whistle resonators.

There can be many ways to fabricate this chuff enhancer and I have included some pictures from Dennis which show one method. Do notice that the hole in the chuff pipe and the hole in the resonator must be positioned well with respect to each other; specifically, that is, they need to be concentric.

You can assure that by drilling the holes after the pipes have been assembled. Dennis' pictures show that drilling operation. You can use any material thickness you have lying around; the 0.020-inch is only a recommendation. And silver soldering the assembly is probably best, but you might just be able to get away with soft soldering it — as long as you dislike smoke-box fires.

Try your skill at building one for yourself!

the stack and sits on the bottom half of the diamond portion of the stack. Looking at the accompanying CAD drawing, you will notice that the exhaust steam comes up through the traditional one-eighth-inch diameter pipe. (This must be mated through a sleeve to the current chuff pipe which needs to be cut off — or you can make a new one to fit.)

At the end of the pipe, it takes a slight jog to the side of the small, one-half-inch pipe which is the interior dimension of the resonator. The chuff pipe is soldered to the one-half-inch diameter pipe at the top. The sound is made when the exhaust steam is blown through the 0.063-inch hole in the chuff pipe



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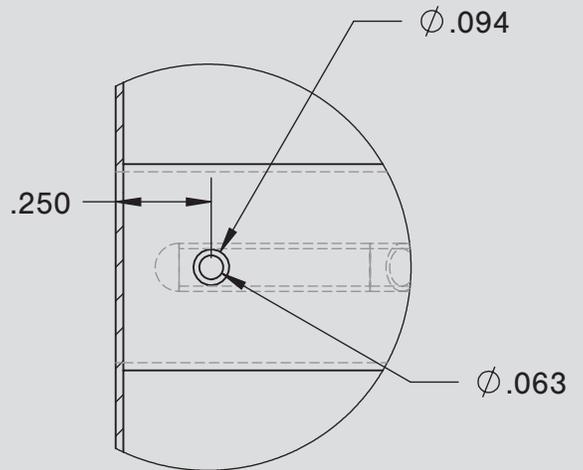
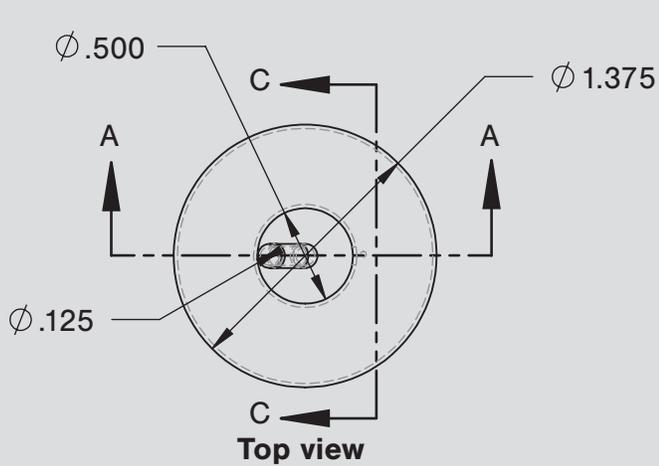



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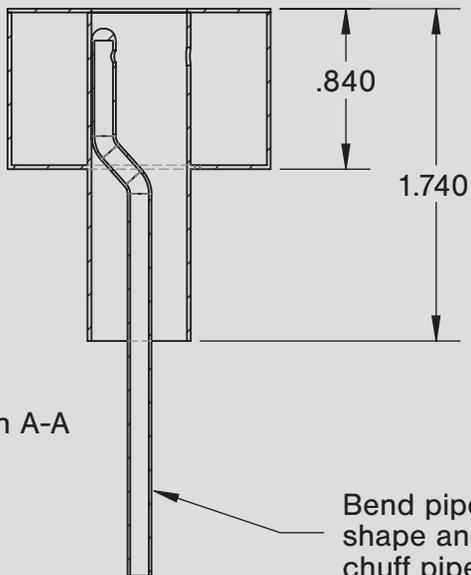
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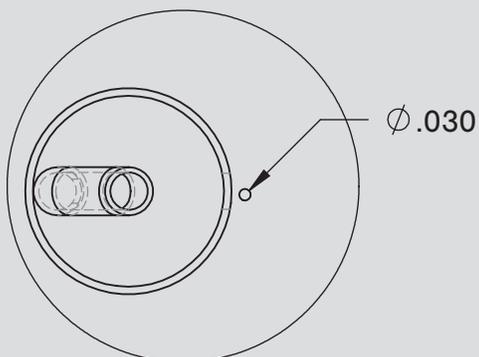
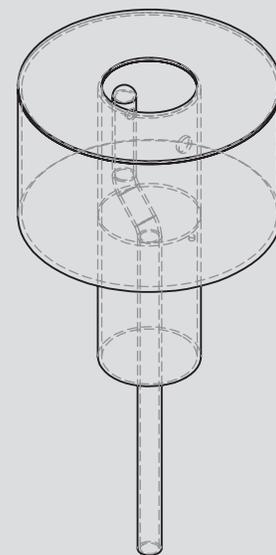


**Detail A**  
Scale 2 : 1  
Shown from Section C-C

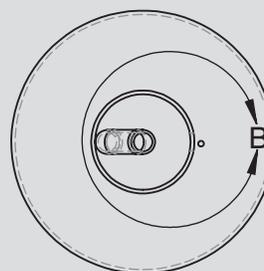


Section A-A

Bend pipe to approximate shape and mate to existing chuff pipe.



**Detail B**  
Scale 2 : 1  
Shown from bottom view



**Bottom view**

Make all parts from 0.020-inch brass and silver solder as shown.



## THE CUPOLA VIEW

### Highballing

**L**ike a train “highballing” — clear signal ahead, proceed at full speed — *Steam in the Garden* is moving at a breakneck pace these days.

Almost to the day of this writing, 24 months have passed since our merry band of toy-train enthusiasts took over management of your small-scale live steam magazine. We have accomplished much; there is still quite a ways to go.

Through the support of you — subscribers and single-copy buyers — and a dedicated cadre of advertisers, *Steam in the Garden* keeps ticking off achievements: more pages than ever, more color pages than ever (in the last two issues we’ve published more color than the magazine did in the seven issues prior to our acquisition), readership growth and (we humbly hope) a gain in quality.

New innovations are far from over; a short list:

- In this issue you will note the first two articles in a new series, “Starting in Steam.” Through the insights of several readers (I’m talking to you, Jeff Paxton), it became clear to us that in order to grow the hobby, we needed to make it less intimidating.

*‘Cupola View’ is written by Editor Dave Cole; you can contact him at [dmcole@steamup.com](mailto:dmcole@steamup.com) or P.O. Box 719, Pacifica, Calif. 94044-0719.*

(Hey, your buddy Fred may know how to do all sorts of technical things in his everyday life and at work, but running a real steam locomotive? That might be a little frightening.)

Toward that end, the series will be running in the magazine — off and on — into the future. But perhaps more importantly, it will become a book (both the real, live, ink-on-dead-trees variety as well as those digital bits that you can read on a Kindle or iPad or Nook) gently guiding the neophyte in their quest toward the nirvana of this exciting hobby. In addition to

the wonderful contributions from Scott E. McDonald and Bill Allen you see in this issue, the core of the work will be provided by hobbyist Carl Weaver.

In addition to the magazine series and a book, another aspect of “Starting in Steam” will be mentoring new steamers; we continue to develop the logistics of how that will work. The plan is still coming together but we hope to reveal it soon.

More on “Starting in Steam” in upcoming issues.

- We are launching a full-year project called the “Steamie Award,” which will honor the best in small-scale live steam videography. You can read more on Page 12 and by visiting [Steamup.com](http://Steamup.com).



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Our site has been the leading repository of live-steam videos pretty much since it started 18 months ago and the "Steamie Award" should bring more and more great visual treats in steaming. This is another innovation from the irrepressible Scott McDonald.

• We have instituted a policy of starting to pay our contributors.

If we have any regrets, they are that the amount is so meager and that it has taken us two years to reach this milestone.

Our goal from the outset has been to make *Steam in the Garden* more professional and how could we do that if we didn't compensate those who make the magazine interesting, informative, visual and readable?

Before going further, we need to thank the dozens and dozens of hobbyists who volunteered their time and effort to put together articles for you over the 20-plus years of the history of *Steam in the Garden*. Without these selfless individuals, there would have been no magazine. Huzzah.

The standard contract was constructed with contributors — rather than publishers — in mind. This means (for example) that if a contributor decides to write an autobiography and the article he or she wrote for us about building a locomotive might fit in as a chapter, the contributor has the right to do that without getting our permission. Or, if the tale of a steamup intrigues a Hollywood producer, the contributor — not the magazine — deals with the filmmaker. Basically, we're buying worldwide magazine rights for one year (plus a few other minor rights).

The contract was reviewed by Texas live-steam

hobbyist — and intellectual property lawyer — Ken Matticks, *pro bono*, as they say (thanks, Ken).

When informed of the policy change a few days ago, more than one contributor said they would decline payment or wish to make other arrange-

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ments; we certainly appreciate those sentiments .

Obviously, if this change in policy propels you into writing an article or preparing illustrations, please don't hesitate to get in touch. The deadline for the May/June 2013 issue is Feb. 15 (deadlines are always the 15th of the even-numbered months, though to sidestep the holidays, it's Dec. 10).

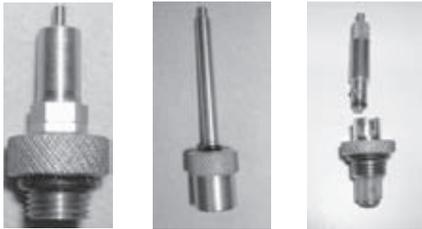
You can read more about contributing (and getting paid for it) on the site; please visit <http://www.steamup.com/contributors/>.

Of course, all these changes come about because of

the aforementioned support of the readers and advertisers (frequently one in the same) of *Steam in the Garden*. Without renewals and extended ad contracts the magazine would be a shell of itself. (Oh, and please remember to thank those advertisers the next time you have dealings with them, for their support of the hobby and *Steam in the Garden*.) You folks have been and remain the greatest asset my fellow co-owners and I acquired when we bought the magazine.

It all looks clear ahead; Sonny has stoked the fire box, I've got the throttle open and we're highballing.

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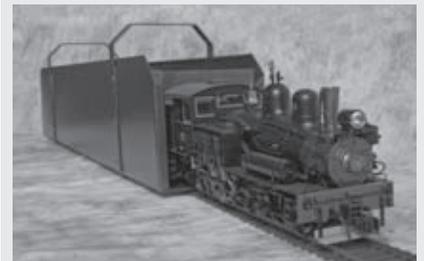
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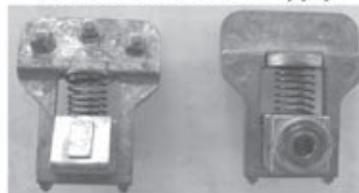
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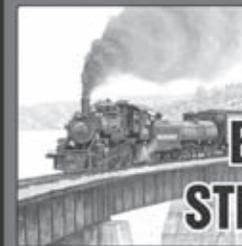


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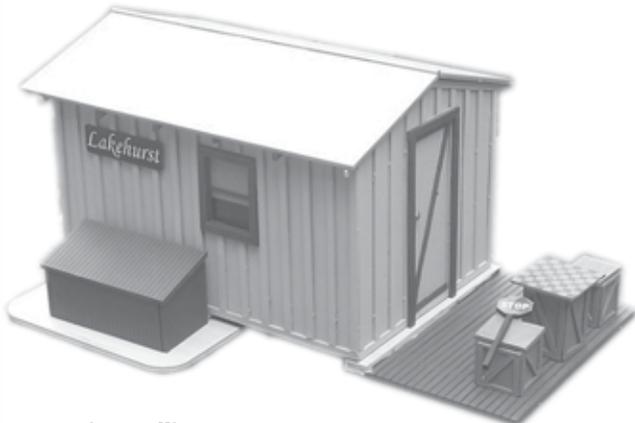
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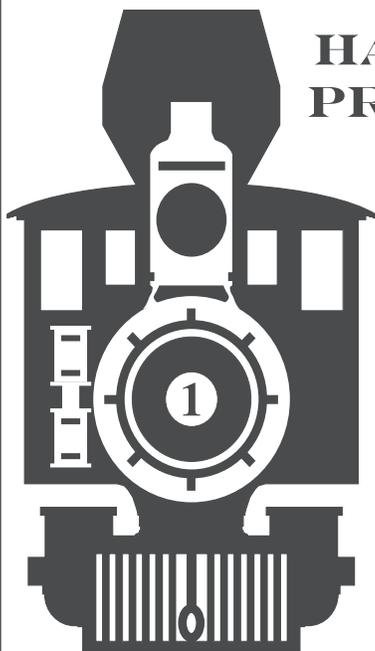
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## TIMETABLE

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**April 12-14, 2013** — Cabin Fever Model Engineering Expo, Toyota Arena, York Fairgrounds, York, Pa. Gas and steam engines, hot air engines, steam boats, cars, live-steam Gauge One model trains. Info: <http://www.cabinfeverexpo.com/>.

**April 25-28, 2013** — Spring Steamup, Staver Locomotive, Portland, Ore. Info: <http://www.staverlocomotive.com>.

**June 5-9, 2013** — National Garden Railway Convention, Great Wolf Lodge, Mason, Ohio. Live-steam track available 24/7. Clinics, demonstrations, tours, dealer room. Info: <http://www.2013ngrc.com/>.

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**Aug. 28-31, 2013** — 33rd Narrow Gauge Convention, Hilton Hotel, Pasadena, Calif. Info: <http://www.33rdnngc.com>.

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

**Puget Sound Garden Railway Society.** Two steamups per month, one at the Georgetown Powerplant in Seattle on the second Saturday and a steamup at a member's track on the fourth Saturday. Info: <http://psgrs.org/livesteamtimetable.html>.

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

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

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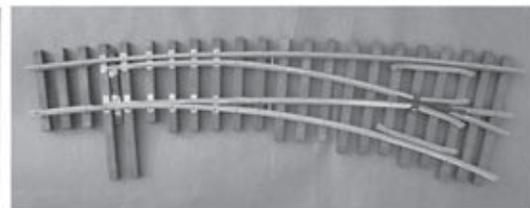
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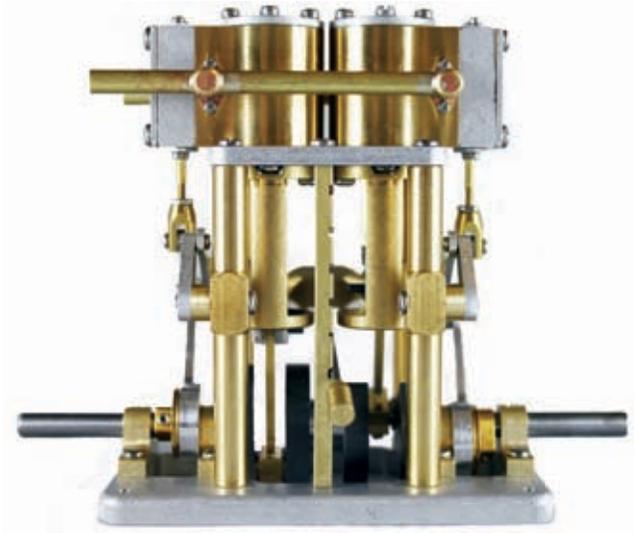
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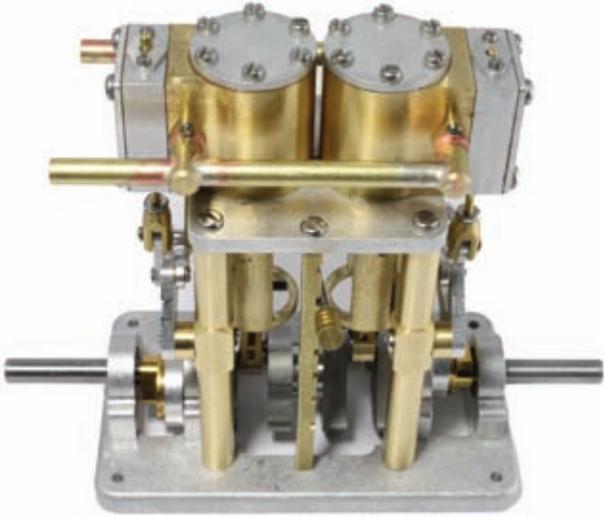


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 Height: 3.375"  
 Weight: 327 g



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 SAME AS TVR1A but with shielded ball bearings  
 Includes full-color assembly manual  
 Dimensions: Same as TVR1A  
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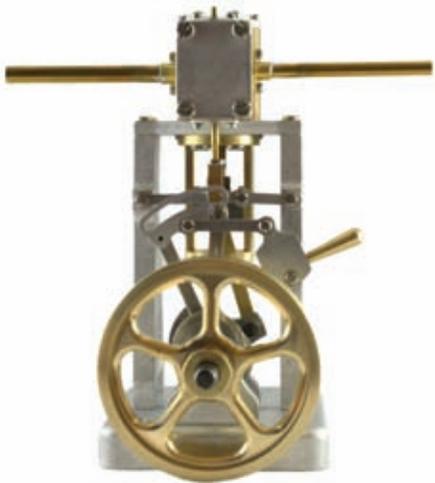
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## Next British locomotive announcement



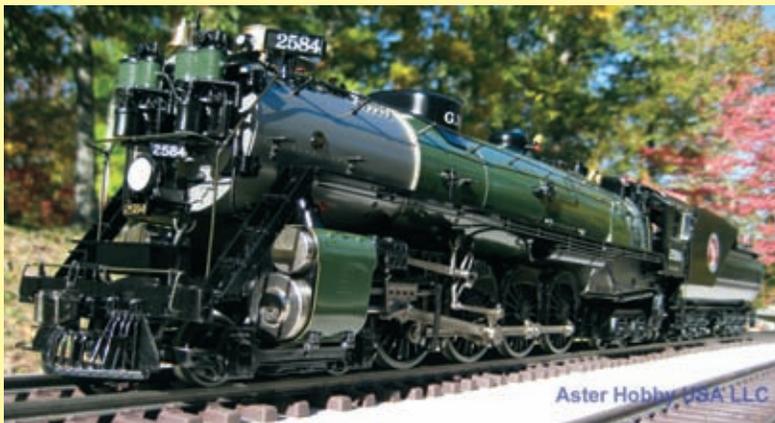
The British Railways “Merchant Navy Class” is now under development. Projected date of release is late 2013. No further details on the model are available at this time.

The prototype was built by South-

ern Railways in 1948 and rebuilt by BR in 1959. It was purchased by a railway historical society in 1967, with the preserved locomotive based at Battersea, England, and is run on excursions throughout the United Kingdom.

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This superb-performing 4-8-4 is still available in glacier green kit form; RTR and black has sold out. Contact your Aster dealer today.



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