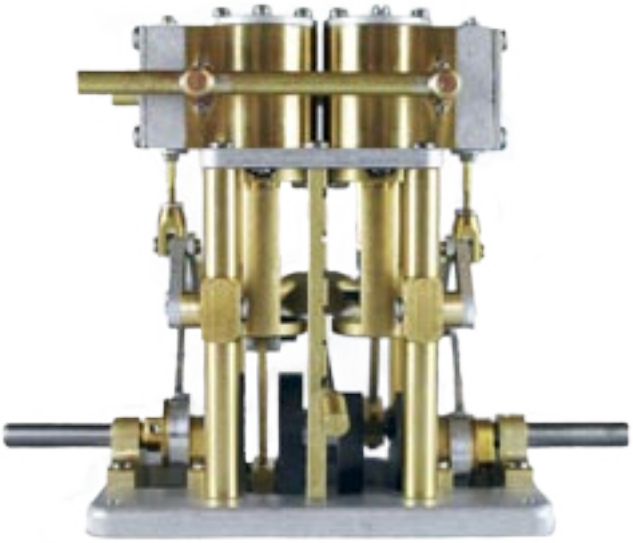
No. 170, November/December 2020 US $5.95
Canada $7.95

STEAM IN THE GARDEN

Maxitrak / Accucraft Allchin Steam Tractor

Blue Comet Build, Adams Radial Review,
New Build Series, Steam Scene... and lots more!

Fully Machined Steam Engine Kits



TVR1A

Ready to assemble steam engine kit: $245
Fully Assembled and Tested: $350
Includes all hardware
Double acting, twin cylinder
Hackworth reversing gear
Includes full-color assembly manual
Dimensions:
Base: 3.000" x 1.844"
Crankshaft end-to-end: 4.344"
Height: 3.375"
Weight: 327 g

TVR1ABB

Ready to assemble steam engine kit: $295
Fully assembled and tested: $400
Includes all hardware
SAME AS TVR1A but with shielded ball bearings
Includes full-color assembly manual
Dimensions: Same as TVR1A
Weight: 323 g

Flywheels for TVR1A / TVR1ABB

MFLY: $20
1 3/8" DIA
(Solid Marine)

BFLY1: $25
1 3/4" DIA (5 Spoke)

BFLY2: $30
1 3/4" DIA (6 Spoke)

HM1

Ready to assemble steam engine kit: $95
Fully Assembled and Tested: $145
Kit includes all hardware
.344" bore, .500" stroke
Double acting, single cylinder
Includes full-color assembly manual

VR1A

Ready to assemble steam engine kit: $119
Fully Assembled and Tested: $175
Includes all hardware
1/2" bore, 1/2" stroke
Double acting, single cylinder
Reversing lever
Includes full-color assembly manual

Graham Industries PO Box 15230 Rio Rancho, NM 87174
FAX (505) 715-4527
Order online at: www.grahamind.com
As always, shipping in the USA is FREE! (USPS Priority Mail)

Vol. 30 No. 4; Issue No. 170; November/December 2020

STEAM IN THE GARDEN

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

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http://www.steamup.com/

Cover: Resplendant on the lawn like a Christmas Tree lit with LED bulbs, the Maxitrak/Accucraft Allchin Tractor pulls its cart of goodies.

Photo by Greg Dahlem
Image Processing by Rick Parker

LATEST WAYBILL

In Memoriam

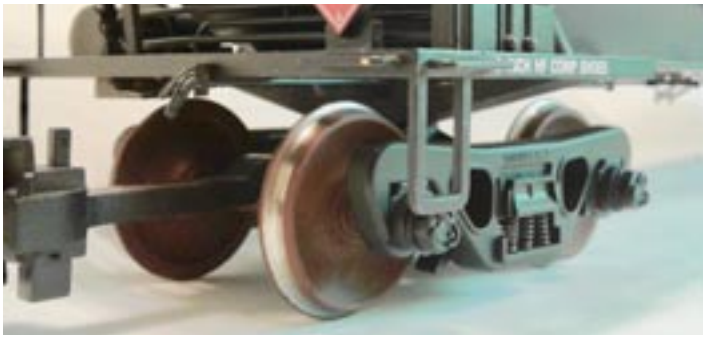
Aster Photo

Mr. Sasaki - It is with a sad heart that ASTER Company of Yokohama Japan announced the passing of Mr. Sasaki, their lead designer for many of the ASTER products produced from 1978 and onward. Mr. Sasaki was responsible for the design and development of the following locomotives:

- PLM 231A Pacific
- BR01
- JNR D51
- BR86
- JNR C11
- C&S Mogul
- JNR 9600 (Hokkaido Version)
- JNR B20
- Baldwin Rear Tank
- IYO Krauss
- NSWR AD60 Garratt
- SR Merchant Navy

His skillful execution is a testament to his engineering skills and his contributions to the hobby will carry on for many years to come.

Gary Raymond Wheels - Gary Raymond Quality Metal Wheelsets has New Painted Finescale 36-inch wheelsets for USA and Aristocraft. For Diesel era Roller Bearing and Steam era Passenger cars they feature an authentic rust color with weathering, shiny tread the same as full size railroad wheels, more accurate width and flange height, correct front and back contours and are reliable on all Code 172, 215, 250 and 332 track. A36PM: Price: $11.95 per axle. Visit *Trainwheels.com*



Accucraft Photos

Accucraft, Union City, CA - Announced via their July 2020 Newsletter the production of the Saxonian IVK 0-4-4-0T for live steam. The 1:20.3 Saxon IV K is being produced for MBV SCHUG. The total batch is only 60 units, 20 pieces in Saxon State Railways' green and 40 in Reichsbahn black. The model comes fitted with the six-channel Spektrum DXe radio control for regulator and reverser. The system is programmable via Smartphone and Tablet app.

Pre-orders are being taken by Accucraft at their website:
https://www.accucraftestore.com

Specifications

- 1:20.3 Scale / 45mm Gauge
- Brass & Stainless Steel Construction
- Mini. Radius: 4 ft. (1.2 M)
- Length: 16.85 in.
- Width: 4.65 in.
- Height: 6.89 in.

Features

- 60 PSI working pressure
- Pressure gauge
- Piston valve
- Water level glass
- Throttle valve
- Blower valve
- Check valve
- R/C Ready

Product Review

Gassin' Up the Roadster Rail Truck

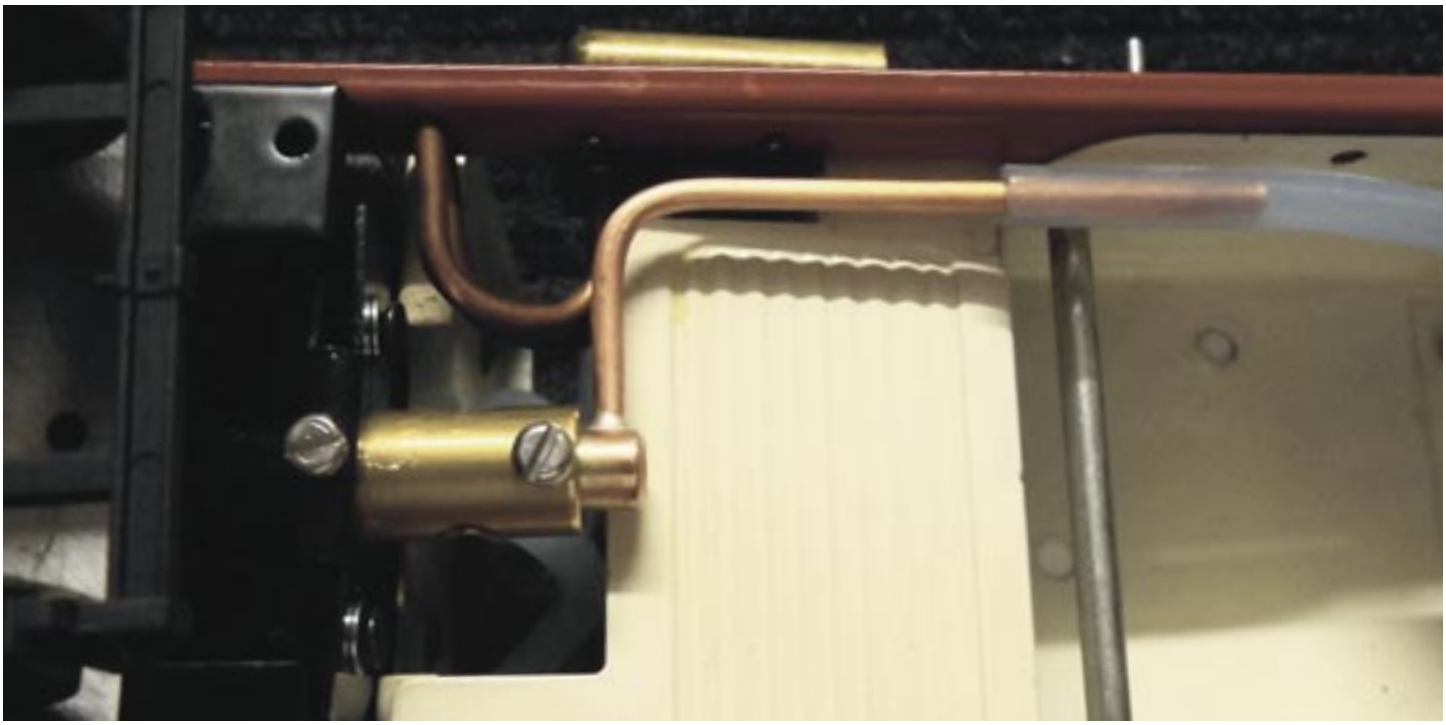
A review of the Mamod Vehicles Gas Firing Conversion Kit

Text and Photos by Dave Frediani

After running so well on my railroad followed by only a few weeks of running on various friends' railroads, my Mamod rail truck (see Steam in the Garden July/August 2018, No. 156) began to run poorly, And it was downhill from that point on. It seemed like I couldn't keep the boiler hot enough to keep it running for more than a few minutes at a time. With the solid fuel tablets, I lost most of my fuel before the boiler got hot enough to steam.

After finishing most of my other projects I thought that I had to do something with my rail truck or just get rid of it. So I invested $149.00 and installed a ceramic burner kit. The kit is made by Mamod and sold by Mini Steam of Sunbury, Ohio, Part number BIX020. The

ministeam.com



Close-up view of the underside of the chassis with the burner bolted into place. Note the silicon tubing to extend the gas run from the modified location of the gas tank.

Gas tank mounted behind the passenger seat for easy access. Still lots of room for a full load of goods.

kit comes with everything that you need. You get the ceramic burner, fuel tank, fuel line, jet and the mounting bracket for the burner.

The installation was very easy. The burner comes with the mounting bracket already attached to it. All you have to do is remove the two mounting screws and screw the bracket to the frame. The fuel line already has the jet installed in the line. Because of the length of my truck bed, the fuel line doesn't fit and I can't mount the fuel tank where it should be, so I had to cut the fuel line. As you can see in the photo of the bottom of the truck, I just needed the fuel fittings on each end of the fuel line. I tried to use as much of the copper fuel line as I could. It took me about two hours to install.

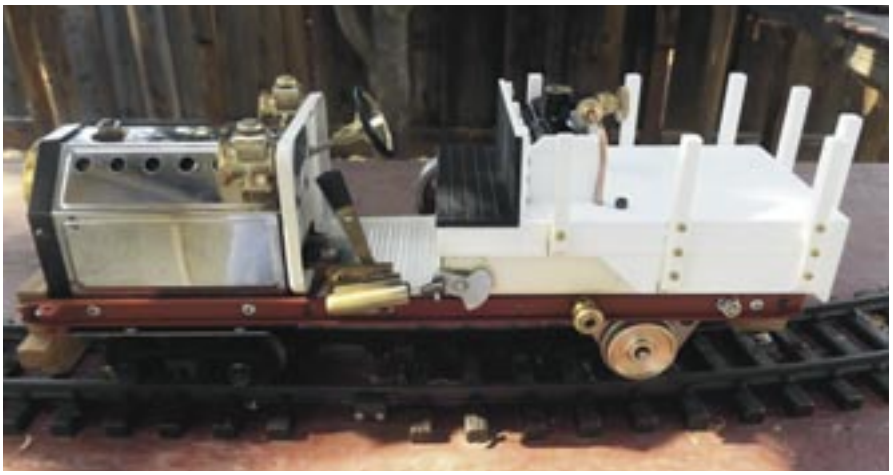
It's very easy to light the burner but you can't see how it's burning, so you don't know if it's too high or too low. After playing around with the burner I found that you have to listen to the sound of the burner to get the right burn. This took me about ten or twelve times to finally get it right. It only takes a little over one-eighth of a turn of the gas valve to get the right combustion that gives off a high pitch sound. If you increase the burn too much you will start to hear an uneven sound. After the Mamod warms up you will need to increase the burn just a hair — no more than an eighth of a turn.

With the ceramic burner the Mamod will run for ten to twelve minutes but you have to keep an eye on the water level as *the Mamod will run out of water well before it runs out of fuel.*

You will also find that the ceramic burner doesn't like the wind, which tends to blow out the burner.

The Mamod runs slower forward than in reverse but I guess I can live with it. All in all the ceramic burner is a big improvement.

I feel that if you're going to buy a Mamod car, steamroller or even one of their solid fuel locomotives, it's well worth installing a ceramic burner.



Taking a test run on Dave's track. It's still a pot boiler, and strong winds are never a favorite of pot-boilered steamers. But the improved continuous heat source makes for better performance.

Review/Project Workshop

Maxitrak/Accucraft Allchin Steam Tractor

Text and Photos by Greg Dahlem
with Sonny Wizelman

With a Little Help From My Friends

As with all my live steam acquisitions, the process started off innocently. Sonny Wizelman, a long time *Steam in the Garden* contributor and past Sacramento National Steam Up Board member, and I decided to partner on a new project. Previously we had worked together, along with other Los Angeles-based live steamers, to build a steam powered carousel which was featured in the March/April 2018 SitG, Issue 154. Upon finishing the carousel, we visited a fellow live steamer's collection and were attracted to a one-inch scale Maxitrak/Accucraft Case Tractor. We soon discovered the tractor was sold out but a new three-quarter inch scale Allchin traction engine was soon to be released. Better yet, upgrade kits would also be offered either to convert the engine into a steam roller, crane with working mechanism, or showman's engine with a full length canopy, belly tank, motion covers, and working dynamo. We chose the showman's option as the ideal candidate for creative improvements.

The Allchin engine is a joint venture between Maxitrak, founded in Great Britain in 1978, and Accucraft. Maxitrak offers a wide range of road and rail locomotives in various scales. Maxitrak/Accucraft produced a number of interesting models including the one-inch Case and Fowler road engines and larger scale rail locomotives such as the five-inch scale Planet and Seven and one-half inch scale Rio Grande Galloping Goose.

Background

A traction engine is a self-propelled steam engine used in agricultural applications, particularly working threshing machines and other equipment with a belt drive off the flywheel. The name derives from the Latin tractus, meaning "drawn", since the prime function of any traction engine is to pull a load. They are sometimes called road locomotives to be distinguished from railway locomotives. The showman's version is a particularly distinctive form of road locomotive. These were operated by travelling showmen both to tow fairground equipment and to power it when set up, either directly or by running a dynamo. Showman's engines would be highly decorated and formed part of the

Stock Allchin — Accucraft Photo

Closeup of the customization applied by Sonny.

spectacle of the fair. Some were fitted with a small crane that could be used when assembling a ride.

Stock Model

The prototype for this model is an agricultural traction engine built in 1893 by Allchin in their well known "Globe" steam works in Northampton, England. This engine has typical Victorian characteristics of the period, with a short smokebox, straight back cab, and smaller front wheels. The model faithfully represents this classic design in three-quarter inch scale, gas (propane/butane) fired, single cylinder with full working valve gear, displacement lubricator, and working steering. I purchased the model through Pete Comley of Sunset Valley Railroads and it arrived in perfect shape. The model was mounted on a wooden base and nicely packaged in a foam insulated cardboard box. The model included operating instructions along with the typical accessories; syringes, large and small Allen keys, spare nuts and bolts and boiler/gas tank test certificates. The operating instructions were easy to follow and the initial run was successful, with the exception that the rubber tread soon separated from the front metal wheels. Not to worry as they were easily reattached and cemented in place using E6000 flexible adhesive. The tractor operates in both forward and reverse and readily responds to steering wheel adjustments.

Showman's Conversion Kit

While the basic Allchin is a nice looking model, it is greatly enhanced with one of the conversion kits. We selected the showman's kit. (Accucraft does offer engines with the kits already installed.) The kit includes a full length canopy with twisted brass stanchions, working three volt dynamo motor and related pulleys, upgraded flywheel and belts. Although the kit included a 1.6mm drill, 2mm tap and mounting bolts, we ultimately elected to use upgraded versions to improve the mounting of the dynamo motor extension on the boiler. Replacing the flywheel and wheel grub screws with stainless steel versions is also recommended.

Customization

Before the engine was ordered, Sonny had already compiled many articles and historical pictures of showman's engines and models. Steve Ciambrone, a fellow LA steamer, also provided inspiration with the modifications he performed on his Allchin model. Sonny and I agreed on a number of improvements, starting with pinstriping with matching wheel color. It soon became apparent that the cost to have the boiler, cab and wheels professionally pinstriped was not within our budget. Jeff Cambell, also a recent SitG contributor, recommended Rick Schutté at California Stripers who specializes in custom car finishes. After viewing the Allchin, he concurred that painting the pin stripping would be difficult and very time consuming, and recommended the application of heat resistant tape. Using a laser cutter, Rick graciously produced custom pinstriping on his tape cutting machine to two widths. He demonstrated how to apply the tape, and after some practice, Sonny mastered the technique. We were fortunate to find a stock hobby paint that was a perfect color match to the pinstripe which was used to paint the wheels. Decals sourced from Stan Cedarleaf were used to highlight the rivets on the wheel spokes. The original rubber

Driver figure from Fun & Games.

Custom wagon by Sonny.

tread was replaced with Wilesco ribbed rubber tread from Minsteam.com.

The canopy with its plain white finish would not do. The research had shown the actual canopy included steel bands with rivet detail. We tried the rivet decals used on the wheels but we were unable to produce the desired raised effect. Finally, we called upon Tim Miller of the Zelatory who was able to produce finely spaced raised rivet detail on brass strips. A number of fine spray coats of grey and black acrylic paint were applied to the canopy before the bands were cemented in place. The lettering on the canopy fascia was applied using custom reusable mylar plastic stencils from Stencil Planet. To ensure the lettering was straight and sharp, I used repositionable spray adhesive made by Stencil Ease to temporarily hold the stencil in place. LED lighting was sourced from Evans Design. We tested a number of canopy lighting alternatives, but settled on a nine volt battery system including a remote control dimmer to control the light emitting from eighteen 5MM warm white LEDs. The front LED headlamp is powered by the three volt dynamo.

Additional details added to the backhead and cab rear end.

The conversion kit included a flat gauge plate with stamped dynamo gauges. After reading the articles in SitG No's 163 and 165 about Tolhurst Model Engineering's (TME) King Arthur, with its detailed dimensional backhead gauges, we knew we wanted to upgrade. Sonny contacted Derek Pollard and Chris Tolhurst and obtained a couple of spare gauges. Jim Gabelich, who hosts weekly steamups in the Los Angeles area, crafted a custom gauge plate.

The cab driver was a great fit and was purchased from Allen Pollock at Fun and Games. Various detailed parts (front headlight, dog and wagon lantern) were procured from Sonny's vast spare parts collection. The rear lamp is an Aster spare and the red lens was cut from Christmas wrapping paper. Sonny also made the wooden tool box, added the Trackside Details water pump, and fabricated a winch used to retrieve rope via a spool on the rear axle.

The wagon is Sonny's design and was produced with custom milled wood. Wheels, along with additional matching maroon tractor paint, were provided by Maxitrak. Special thanks go to Maxitrak for their assistance regarding the conversion kit installation and for professional advice.

Summary

This project was a creative journey and along the way we connected with a number of old friends and made a number of new acquaintances. We truly learn from and help one another. I thoroughly enjoyed our adventure and look forward to our next project.

Building the Blue Comet Part 5

Rick Parker Photo

Text & Construction Photos by Bill Allen

Boiler Accessories

Many of the boiler accessories for scratchbuilt locomotives can be purchased from companies like Trackside Details, but if you are trying to get an exact replication, you will need to make some of them yourself. This was the case with most of the small parts on the Blue Comet.

Two of the prominent parts are the air pumps and water pump. The duplex air pump is made up of two simple pumps which are turned out on the lathe. A one-eighth inch hole is drilled to hold the polished stainless rod which represents the piston rod. I had some urethane castings of the valve mechanism which were glued on with JB Weld. The water pump was milled from flat bar stock with dual stainless rods (**Photo 5-1**). They are painted blue and then the paint is scraped from the stainless rods with a hobby knife before the paint is fully cured (**Photo 5-2**). The running board is notched out with the band saw for the air pump clearance (**Photo 5-3**) and the water pump (**Photo 5-4**). I like to make my own steam generators as I can use the stainless rod and drill out passages so that I can supply steam which comes out the exhaust pipe (**Photo 5-5**).

Photo 5-1

The Comet had a power reverser which I duplicated. It is hooked up to the reverse linkage but is non-working. (**Photo 5-6**). And a small air tank works great for a dead leg lubricator (**Photo 5-7**).

I cut some groves in a block of wood to hold screws for painting to match already painted parts (**Photo 5-8**).

Photo 5-9 shows the right-angle tubing-fitting I used in the smokebox. On the top the two fittings are placed in the position they will be in the smokebox. Below you can see how the two pieces seal. The cone-shaped one fits into the chamfered hole on the one on the left. **Photo 5-10** shows the pipes assembled and **Photo 5-11** shows them in the smokebox behind the exhaust tube.

Photo 5-12 shows the whistle setup. It is a little

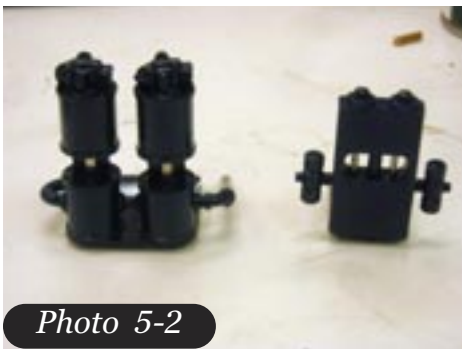
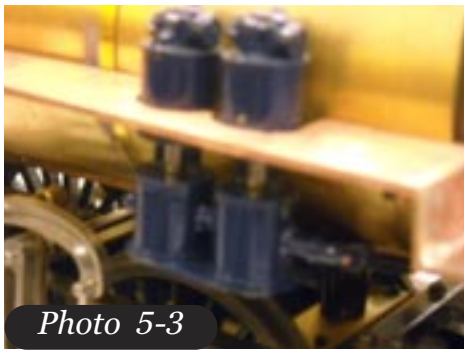


Photo 5-2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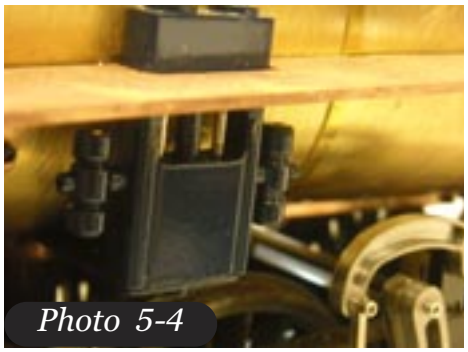
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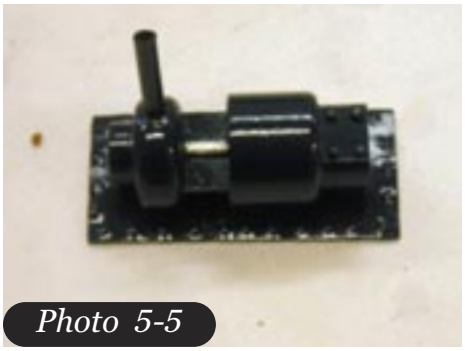


Photo 5-5


Photo 5-6


Photo 5-7

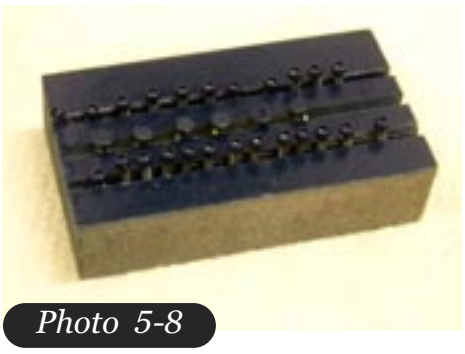


Photo 5-8


Photo 5-9

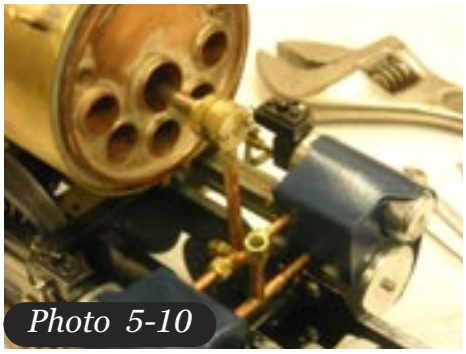


Photo 5-10

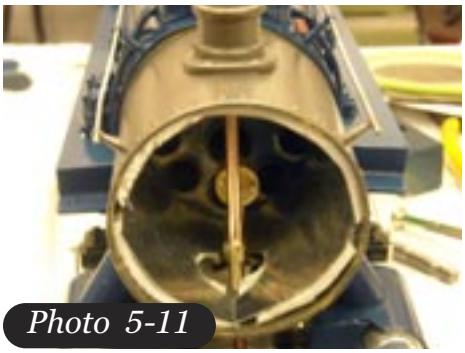


Photo 5-11


Photo 5-12

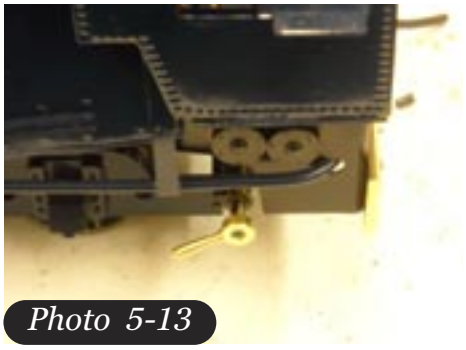


Photo 5-13

hard to see as everything is painted blue but there are two long whistle tubes on either side of the boiler where the air tanks were on the prototype. One has a plug in the end to give it a higher pitch than the other. Alongside the firebox on the bottom of the photo, you can see the third whistle and the piping which hooks them all together.

Photo 5-13 shows the faux coal auger motor cylinders and the axle pump bypass valve handle. You can also see the main whistle pipe going to the whistle valve which is behind the bulkhead.

Inside the cab are a gang of valves which supply low pressure steam for the steam generator, boiler blow down and tender water heater. **Photo 5-14** shows the needle valve with its Peek* knobs. In **Photo 5-15** you can see the valve body. The hole you see goes all of the way through and is the pressure inlet. The outlet is at the end of the body.

* PEEK - acronym for Polyether ether ketone — Polyether ether ketone is a colourless organic thermoplastic polymer in the polyaryletherketone family, used in engineering applications because of its heat resistant qualities.


Photo 5-14


Photo 5-15


Photo 5-16


Photo 5-17


Photo 5-18

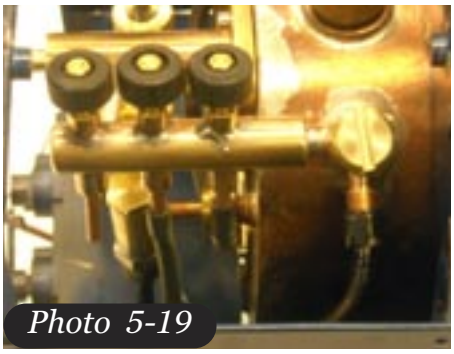


Photo 5-19

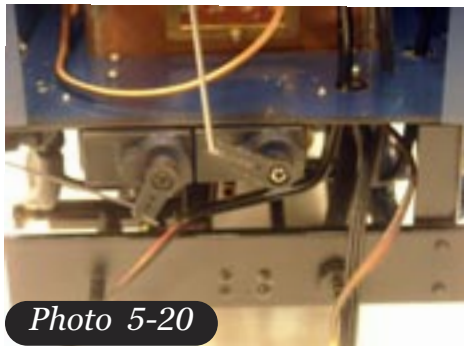


Photo 5-20

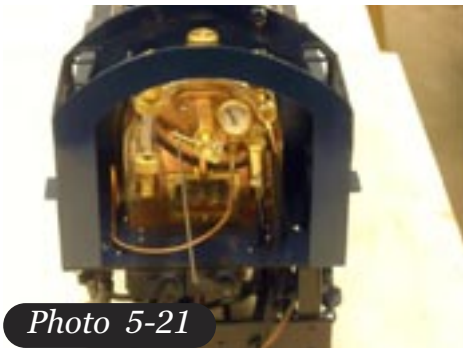


Photo 5-21

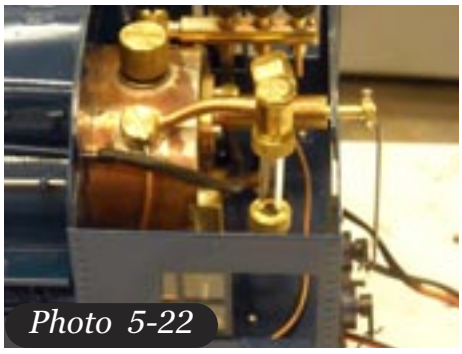


Photo 5-22

Photo 5-16 shows the valve in the closed position. You can see how the needle portion is visible through the hole and it is sealing off the outlet on the bottom. I needed to make sure everything was lined up for the solder job so I used a piece of music wire to do this. I first checked it for fit and length (**Photo 5-17**) and then inserted it through all three valve bodies for soldering them on to the manifold. I also soldered tubes onto the outlet openings of the valve bodies (**Photo 5-18**). The manifold was then soldered onto the banjo fitting and installed on the boiler. Note that the outlet hoses are just slipped on to the outlet tubes as there is no resistance on any of the destinations (**Photo 5-19**).

Photo 5-20 shows the RC servos for the throttle and the whistle valve. They are mounted under the cab floor to keep them out of sight as well as away from the cab heat. **Photos 5-21** and **5-22** show the in-cab valves and fittings.

Pilot

The bars on the cow catcher scale out to 3/32-inch, so I cut some 3/32-inch copper tubing to length. Then, using a stop on my vise, I flattened the ends to the same depth and then drilled 0.040-inch holes in the middle of the flattened ends. I then measured the width of the flattened ends, which was 0.140-inch, and drilled holes that distance apart in the top bracket. I then inserted brass rivets with 1/16-inch heads and 0.032-inch shanks which were a quarter-inch long. I laid everything on the soft fire brick and hammered the long rivets through both pieces and into the firebrick which holds them in place. I held everything in place on the other end with music wire pins, and silver soldered everything together (**Photo 5-23**). From my drawings, I measured the shortest and longest rods. Then on the vise, I bent the bottoms at the proper angle (**Photo 5-24**). The bottom bracket was

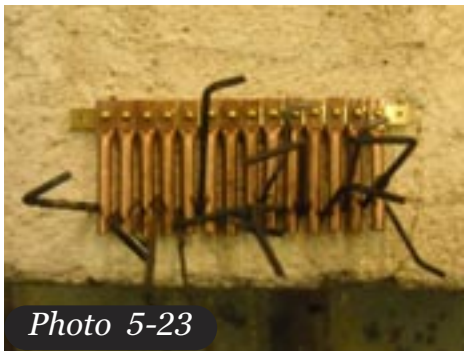


Photo 5-23


Photo 5-24

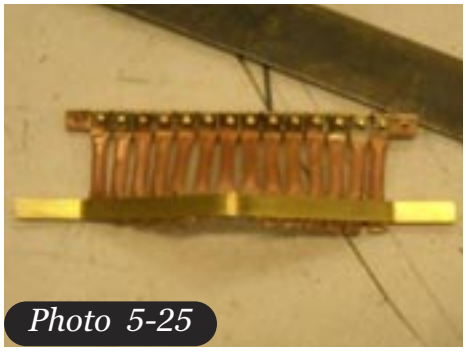


Photo 5-25

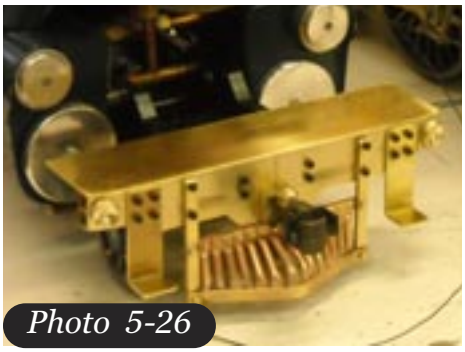


Photo 5-26


Photo 5-27

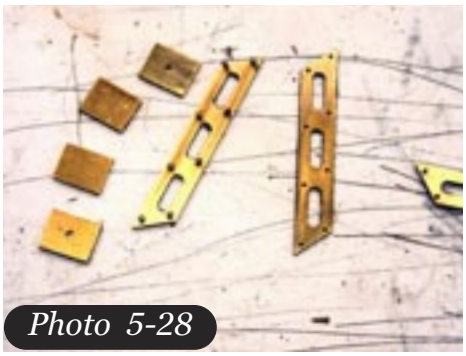


Photo 5-28

bent to shape and the rods were bent out to match it (**Photo 5-25**) and it was soldered together. The bottom of the rods were sanded even with the bottom bracket. The bottom bracket was trimmed to length and drilled out for the two vertical brackets and it was installed onto the front buffer beam (**Photo 5-26**).

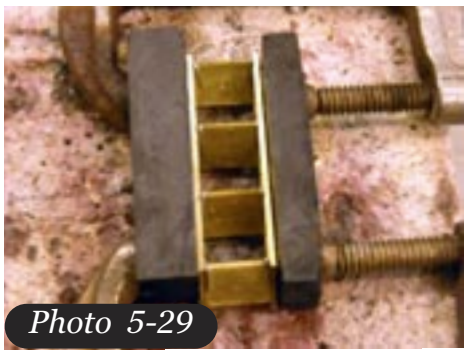


Photo 5-29


Photo 5-30

Photo 5-26 also shows the buffer and pilot deck construction which was mostly cut from 1/16-inch brass sheet stock. The detail on the ends was made with pieces of K&S square tube soldered together. The buffer portion is three pieces with the end pieces angled back to hold the pole pockets.

Photo 5-27 shows my rendition of the Automatic Train Control and cab signaling equipment used by the Central New Jersey. As they shared the Southern New Jersey trackage rights with the Pennsylvania Railroad, they both had to have the Union Switch and Signal apparatus used on the PRR.

I understand the bottom box held the batteries and the top held the electrical components. In my model, the lower box holds the light switch for the non RC engine, which you can't see as it is on the right side of the box. The lid and upper box are removable for servicing.

The step sides were CNC cut by Dennis Mead and using the same measurements, I cut and drilled the steps (**Photo 5-28**). I then used one-eighth inch long rivets with 1/16-inch heads and 0.032-inch shanks to hold everything together. When soldering rivets into blind holes, the rivets tend to pop out as the air inside expands. I used two flat bars of carbon to clamp everything together for soldering (**Photo 5-29**). I laid snippets of Staybrite in the seams and bent them over so that they didn't fall off while soldering (**Photo 5-30**).

In the next issue we will cover the cab and tender construction.

Accucraft Adams Radial

Text and Photos by Marc Horovitz

This locomotive is known as the Adams Radial 4-4-2. "Adams" is William Adams, a British locomotive designer. "Radial" refers to the trailing truck, which swung in an unconventional way. Most single-axle trailing trucks were pivoted to the frame, the pivot point being somewhere forward of the axle. The radial axle, however, was held in a sort of sliding cradle, the sliding action being in an arc with a theoretical pivot point somewhere forward, between the frames. This arrangement gave the axle a much longer pivot radius without the nuisance of a lot of metal from the pivot point getting in the way of other locomotive functions, like the firebox, while still letting the engine negotiate relatively tight-radius curves.

Construction of these engines commenced in 1881 by four companies that eventually produced 71 examples for the London & South Western Railway. The engine was originally used primarily in commuter service around London. Accucraft's model is based on the engines made by Neilson & Co.

Specifications

Gauge: 45mm
Scale: 1:32
Weight: 6 pounds
Dimensions:
Length: 13-3/4in. (349.25mm - over end beams)
Width: 3-3/16in. (80.96mm)
Height: 4-7/8in. (123.825mm) - over stack. In 1:32 scale this works out to 36ft 9in. x 8ft. 6in. x 13ft., respectively
Fuel: Butane fired, single-flue copper boiler
Cylinders: Two double acting, piston-valve cylinders
Valve Gear: Outside cylinders, inside valves Piston-valve reversing, controlled from the cab
Fittings: safety valve, throttle, water glass with blowdown, filler plug with Goodall-type valve, displacement lubricator, half-inch pressure gauge
Livery: Several prototypical paint schemes available
Price: $2,110 built up; $1,945 kit

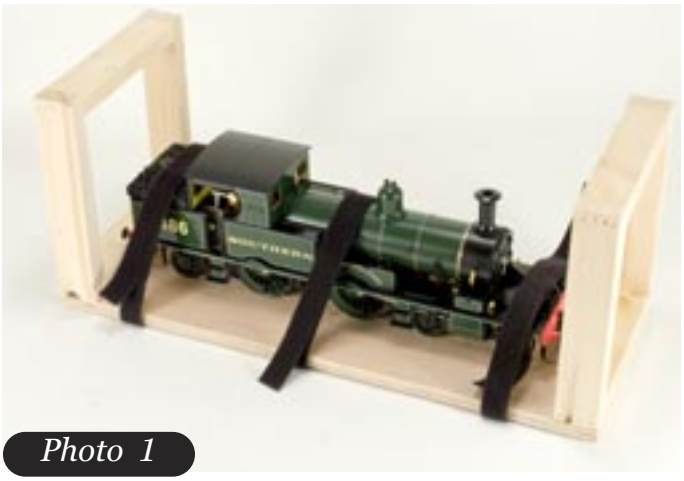


Photo 1

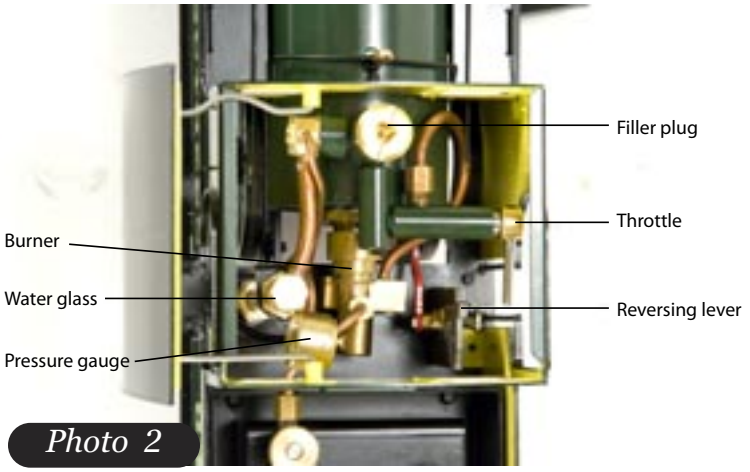


Photo 2

Our built-up review sample arrived in well padded cardboard box. The locomotive was strapped to a sort of wooden cradle with velcro straps. This cradle can be used to transport the engine when it is strapped down (**Photo 1**).

First impressions were excellent. Accucraft's model is fully featured. The cab is accessed by opening the roof, which flips over to the left. Boiler fittings include a safety valve (hidden under the steam dome), a water glass with a blowdown valve, a half-inch diameter pressure gauge, a filler plug with a Goodall-type valve, and a throttle (**Photo 2**). The handle for the blowdown valve is beneath the footplate and is difficult to reach and operate (**Photo 3**).

A displacement lubricator is housed in the left side tank, ahead of the cab (**Photo 4**). The gas tank sits in the coal bunker and is fitted with a standard filler valve and control valve (**Photo 5**). A dummy coal load is provided, which rests lightly over the gas tank. I would like to see a more secure fit for this dummy load—it doesn't seem to seat well.

The boiler is Accucraft's typical single-flue copper boiler. The burner in the cab has an air-adjustment ring that can be used to aid the fire, if necessary. Lighting up is done by opening the smokebox door, introducing a flame, then slowly opening the gas valve. The fire then flashes back into the flue. Accucraft uses tiny magnets to hold the smokebox doors on their British engines closed. I like this and wish they would apply it to their American engines as well (**Photo 6**).

The engine has two double-acting cylinders. These are outside the frames, while the valves are inside, as per the prototype. This engine is equipped with piston valves. Reversing is accomplished through the use of a third piston valve, ac-

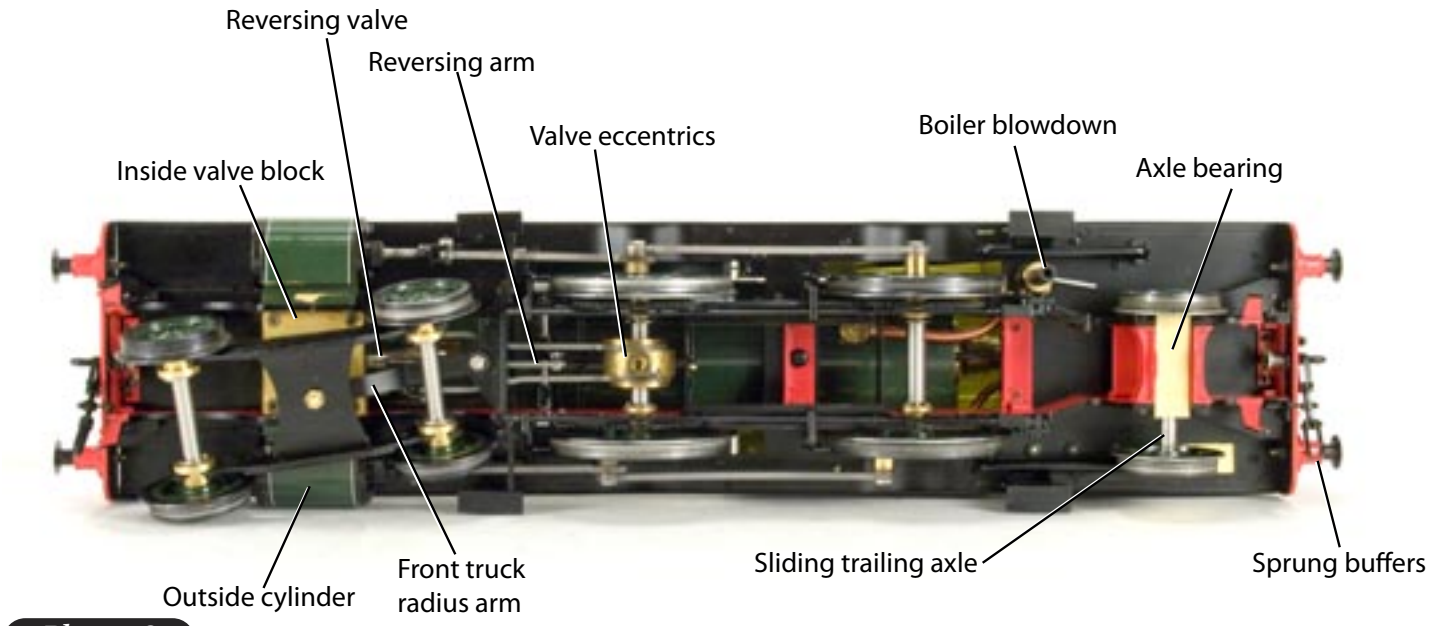


Photo 3

Photo 4

Photo 5

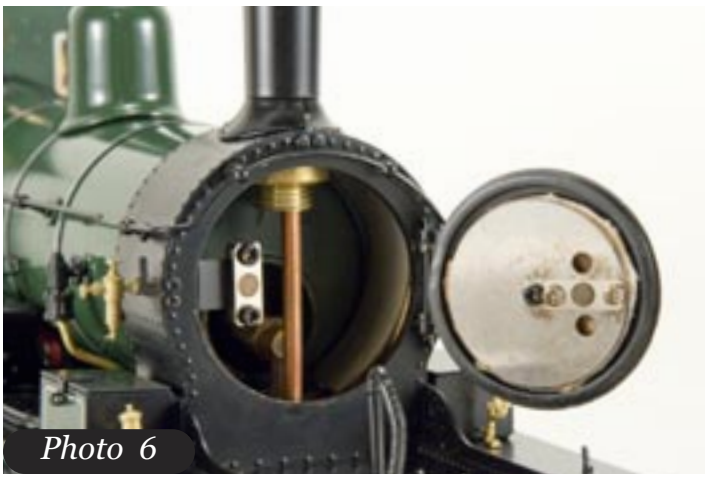


Photo 6

Photo 7

tuated by a lever in the cab. This reverses the admission and exhaust steam to and from the cylinders, effectively reversing their action.

The detail level on this locomotive is good. The prototype was fairly plain, as British engines tended to be. On the model, there are several small castings of very high quality. The spoked wheels are beautifully rendered, with thin, delicate-looking spokes. Dummy springs and brake detail are visible behind the wheels.

The front truck is attached to an arm that is pivoted just behind the second axle. The rear axle is, in fact, not a radial axle. Instead, to simulate this action, the rear axle is allowed to move from side three-eighth inch. The quoted minimum radius for this engine is four feet six inches, which is pretty tight. The rear axle is also sprung, which the drivers are not.

Couplers are the standard British hook-and-link variety, and are nicely modeled (**Photo 7**). All of the buffers are sprung, but the springs are quite stiff.

Paint and graphics are well up to Accucraft's already-high standard. The fine white lining on our review sample is outstanding. The wheels, including the treads and flanges, have been blackened, which I find quite attractive (**Photo 8**).

In addition to the engine, the buyer is provided with a set of instructions, a pair of syringes, Allen and nut wrenches of various sizes, and some extra nuts and bolts.

The instructions are written for beginners. In reading through them I did not find anything out of the ordinary for the operation of this locomotive. I prepared the engine in the usual way, first oiling all of the moving parts with a lightweight machine oil, then topping up the lubricator with steam oil. Distilled water was used to fill the boiler through the filler plug, using the syringe supplied. I filled the gas tank with butane and placed the engine on the track.

With the smokebox door open, I cracked the gas valve and struck a fire. The flame instantly popped back and burned as it was supposed to, below the burner. No adjustments were necessary. The instructions say to leave the smokebox door open for a couple of minutes, which I did. The gas surged for a bit before settling down. Once it settled, pressure came up to blowoff at around 50 pounds in

Photo 8

eight to 10 minutes. It was a hot summer day when I ran it, so your results may vary.

The engine was a little slow to get going while clearing the cylinders of water and warming them up. When it was ready, it took off without complaint. The engine ran steadily for around 15 minutes, running light. Even with the throttle wide open it did not run away. Top speed seemed reasonable. Performance in reverse was similar. There was audible exhaust chuff over the roar of the fire. There may have been a little blow by, too, though that didn't seem to affect performance. When the run was over, I tried to blow down the boiler but, as mentioned above, the handle to the blowdown is too difficult to easily get at, so I just let the engine cool naturally. Subsequent runs were similar.

This is a locomotive that will perform best after a little practice on the part of the driver and a little wearing in on the part of the engine. However, right out of the box, performance was good. The non-return valve built into the filler plug will allow you to refill the boiler when it's under pressure, but you'll need the right kind of pump bottle (not included).

All in all I was quite pleased with this locomotive. It's well designed and easy to operate. It runs well, the cab is fully fitted, and it looks terrific. This is an unusual and, in my opinion, an exceptionally elegant little engine.

Saturday Morning Steam

A collection of Live Steam Rogues of the Bay Area of Northern California

Text by Rob Lenicheck
Photos from Members

We in the Small Scale Live Steam community are a unique bunch from various walks of life, but sharing in one passion – the enjoyment of locomotives which are powered only by steam. While it's true that some run our engines with the assistance of radio control, most of us consider electricity a four-letter word when it comes to our steam toys. They bring us great joy and are a nice diversion from the world's problems, especially now.

A few of us in the San Francisco Bay Area are lucky enough to be included in a group of live steam modelers who not only embody a variety of talent but are willing to share ideas and, more importantly, inspiration. We have those who specialize and are experts in scratchbuilding, weathering, bridge building, 3D Computer Aided Design, CNC machining and almost every other conceivable aspect relating to the hobby. Our members are often on the cutting edge of techniques which help to promote the ease of one-off manufacturing.

The EDH moniker was derived from the names of three live steamers who started an informal group to discuss their live steam passion. The "E", Eric Maschwitz, the "D", David Wegmuller, and the "H", Henner Meinhold, originally met at various steamups in the Bay Area almost 20 years ago, and all expressed a common interest in designing and building a working live steam donkey engine, simulating timber operations. They, indeed, did do just that, complete with power winches, drag lines and other related appurtenances, and a special addition was built for the Bay Area Garden Railway Society (BAGRS) live steam portable track to show it off.

These are the four live steam donkey engines which were built as a result of the group's three founders meeting together.

As the weeks and months went on, the group started expanding to include people with other interests but still centering around live steam. The group started regularly meeting at Henner's house, who graciously opened his place to the group every Saturday morning. No, we didn't rely on donuts or beer as a draw – just a rousing discussion of what each of us did the past week or planned to do the next, and how to go about doing it. It became kind of a fun show-and-tell exchange of ideas which we all found very stimulating.

Each of us brought our expertise and interests to the meetings but enjoyed learning about the work others were doing. Most of us were focused on some aspect of steam engines, either scratch-building or altering off-the-shelf locomotives. But discussions were not limited to that topic, which made things very interesting at times. All in all we considered, and still consider, our group to be something very special and unique. There is a real camaraderie and brotherhood which we share.

Here is a portrait of each "member" of the group and what they have done in their live-steam endeavors.

Henner Meinhold

Although he has been in the US for over 20 years, Henner is a German native and is one of the founders of the EDH logging group which forms the nucleus of the Saturday morning meetings. He often has answers to our engineering queries, drawing upon his Phd in Physics background. Like many of us, he switched from building HO models to live steam. So far he has scratchbuilt four live steamers and one diesel. In the German tradition, his models look and run like fine clockwork. His builds have been published in Narrow Gauge and Shortline Gazette, MyLargescale.com, and the German Buntbahn forum.

It was with great sadness that we learned that Henner is moving back to Germany to be with his family and watch his granddaughter grow up. Richard Murray hosted a going-away party for him despite the Covid threat. Henner's inspiration and hospitality will be greatly missed!

Henner's scratchbuilt Guiness Steam Tram

David Wegmuller

David has done many scratch builds and kit-bashes. He designed and built most of the BAGRS portable track as well as a working steam turbine locomotive. Additionally, several years ago, for fun, he developed a phone app which controlled the servos in one of his live steam engines based on Bluetooth and the Arduino processor. He is currently building a track in his back yard.

Eric Maschwitz

Eric is the founding member who is the "artiste" of the group. He has a background as a creative designer for the Disney Corporation, among others, and is an expert in weathering. His young son has benefitted from Eric's expertise in building many functional buildings such as a beautiful scaled-down depot. In addition to doing his 1:20.3 live steam work, Eric has a three and one-half inch gauge railway installed around his house on which he runs his quarter-scale Plymouth and live steam

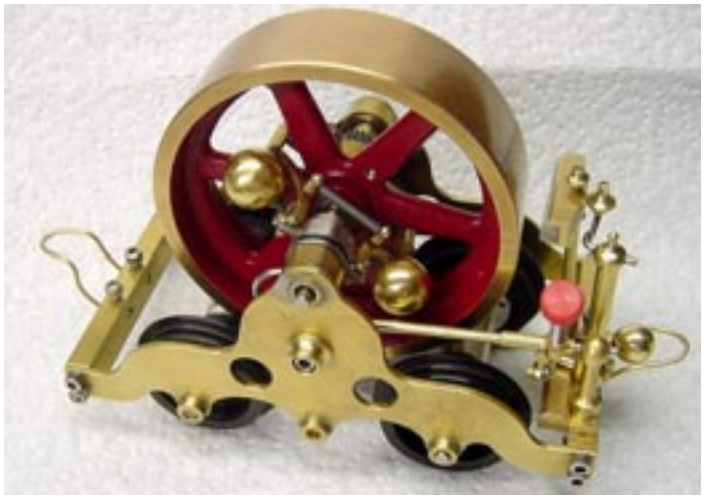
Eric's custom water tank (above right) and Krauss locomotive (above).

Shay, complete with a to-scale, working water tank and coal tipple. His creations are always meticulously built with an eye for detail.

Dennis Mead

Dennis is a great behind-the-scenes contributor and "go-to" guy for the group. His extensive knowledge of mechanical and electrical systems coupled with his ingenuity helps us solve many problems. He designed and built two different kinds of drag cars, each based on either mechanical or magnetic forces. When he heard of the need from a certain member of the group, he designed and built an automatic coal crushing tool which delivers smaller size coal than is commercially available, without undue waste. Due to his machining skills and CNC capability, he is relied upon to fabricate difficult parts for the group.

Dennis' scratchbuilt custom coal crusher. This tool can crush larger pieces of coal down to about ¼-inch.



Dennis made this beautiful, mechanical load car which increases the drag as the car goes faster

Bill Allen

Known for his magnificent locomotives with impeccable craftsmanship and documentation on the My Large Scale website, Bill has been scratchbuilding for about ten years and has built over 20 live steam models. He learned many of his skills from his workworking background and he has transferred many of the techniques he used there to cutting metal. Bill is a real process innovator and throughout all his builds has somehow managed to keep all ten of his fingers. His articles have been published in *Live Steam, Steam in the Garden* and *Narrow Gauge and Shortline Gazette*.

Above: Bill's last build based on the prototype. The model is a working compound modeled after the prototype currently at the Niles Canyon RR in Niles, CA. Bill built three of these concurrently.

Rob Lenicheck

Rob is a scratchbuilder and the foremost expert in our group specializing in the "dark side" of coal- fired boilers. He has been scratchbuilding for about 15 years, designing the engines in 3D CAD, and has also converted many butane engines to coal. He has had articles published in Steam in the Garden and Garden Railways.

This coal-fired engine is designed and built from the prototype found at the Colorado RR Museum in Golden, CO.

Bill Mansell

Bill's background as a tool and die maker makes for his beautiful machining work. He has been scratchbuilding for many years and, being from the UK, he has, to this point, built mainly G1MRA type locos. He is currently building a modified Project Loco.

Bill's scratchbuilt "Penrhyn" locomotive.

Steve Shyvers

Steve has been in the hobby for many years and has done conversions of Roundhouse engines to both coal and alcohol. His specialty is getting his engines to run impeccably by tweaking and rebuilding various components, especially after an impromptu drop to the floor. He has also scratchbuilt

Steve's portage locomotive with cars.

many pieces of rolling stock. He enjoys making parts out of scrap pieces he has lying around the house and common hardware store parts.

Sanjaya Kumar

Sanjaya is a newcomer to the group and to the hobby itself. But he is one of those Silicon Valley "high tech guys" who was looking for a hobby to go with his recently converted CNC lathe and mill. He met some members of the group at a local steamup and got inspired to join in. His first endeavor in the hobby was to put together an Aster Mike kit (!) and has recently completely a scratchbuilt "Eric" Loco, based upon the design in the book "Steam Trains in your Garden" by Brian Wilson.

Sanjaya built this to the plans found in the book by Brian Wilson.

Ron Sickler

Ron has been into every imaginable pastime (scale power planes and black powder guns among them) before finding the live steam hobby and joining the group several years ago. He simply loves working with his hands and has progressed with

his skills enough to complete several scratchbuilds. Unfortunately, he has also discovered the joy and fun of running a coal-fired loco.

Ron (left) and his first complete scratchbuild (right).

Richard Murray

Richard is the "Mr. Bridge" person of the group. He has built, and/or rebuilt, all of the magnificent bridges on his beautiful layout. The materials he has used span from brass to steel to plastic to rock and everything in between. He takes great pride in acknowledging that, a la Tom Sawyer, he conned his wife, Melinda, into repainting all of the bridgework on the layout recently.

It has been such a privilege to be a part of this group over the years. Prior to the pandemic each of us considered ourselves lucky that we live close enough together to meet under Henner's roof, although we have been Zooming it for a few months now. With Henner leaving we will have some kind of reorganization, hopefully, to continue our learning and ideas exchange.

This bridge took several months to build. The two abutments are comprised of thousands of individually cut stones.

Another bridge on Richard Murray's layout. This is supporting Bill Allen's Skookum at the moment.

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Workshop Project

The Minitram

Part One

Design, Text, and Photos
by Marc Horovitz

Steam motor and lubricator

In this four-part series we'll build a little tram engine. I designed this engine in 1992 to be a project that my daughter — age 12 at the time — and I could do together. She would build hers and I'd build mine, showing her what to do and how to do it. We ended up with a pair of identical steam locomotives that were interesting in appearance, ran well, and had enough power to pull a train commensurate with their size.

The engine can be seen not only in the photos, but in the general-arrangement drawing on **Figure 1**. It has one, single-acting oscillating cylinder that, through a double-reduction gear train, is geared to the axle around 13:1 (12.84:1 actually). It has a horizontal, transverse boiler and burns alcohol. The fuel tank is carried under the footplate between the frames and the burner has a single wick. A displacement lubricator is positioned in the steam line to the boiler and steam is exhausted through the stack. There is no throttle or reversing mechanism. Because it is geared down so much, its speed is reasonable. The low gearing is also what gives the engine enough power to actually function as a locomotive.

This engine is suitable as a beginner project or a fun quickie for a more experienced builder. The major tools that you'll need are a drill press and a lathe of at least three-inch throw. The only things you'll have to buy for the engine are a safety valve and the gears. The required gears are in the sidebar. You can also buy wheels, if you like. The wheel diameter, measured over the tread, is one and one-eighth-inch. You can change that a little, if you like, but the wheel should be at least one inch in diameter over the tread.

This will not be a how-to-run-a-lathe series. I presume that you already have a lathe and you know how to use it. I'll be showing you how I do some things but not everything. You'll be drilling holes in metal and using taps and dies to make threads. Most dimensions for the engine are not critical — they can vary slightly. However, when building the motor, the dimensions are critical and must be marked out carefully and adhered to. All lathe work will be done in the three-jaw chuck —

Gears

These are the gears you'll need to order. I got them from Tower Hobbies, (https://www.towerhobbies.com). The cost should be around $25-30. I bought extra set screws just in case, but didn't use any.

All gears are made by Robinson Racing

Qty.	Pitch	Teeth	Tower Hobbies pt. no.
2	48	43	LXWLJ8
2	48	12	LXEX10
1	set screws (6)		LXEX09 (optional)

Things that you'll have to supply

- All materials and fasteners.
- 4-40 set screws (this is on the list just because they're a little unusual and you may not have them).
- Wheels (if you don't want to make your own).
- Safety valve.
- Your choice of couplers and their mountings.

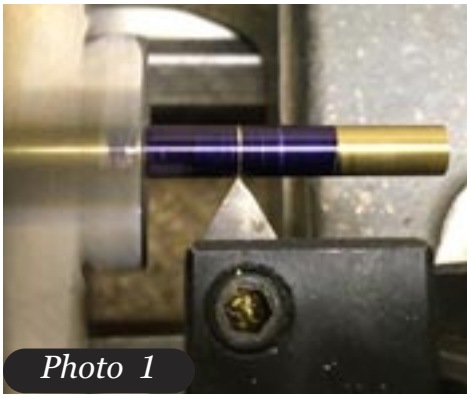


Photo 1

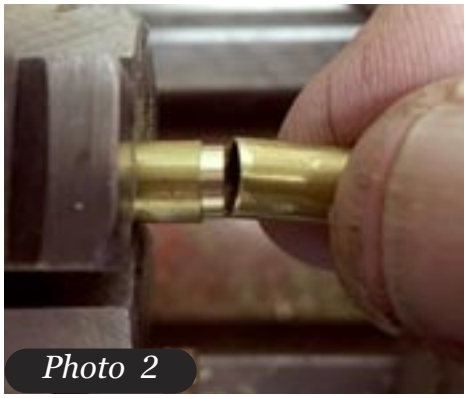


Photo 2

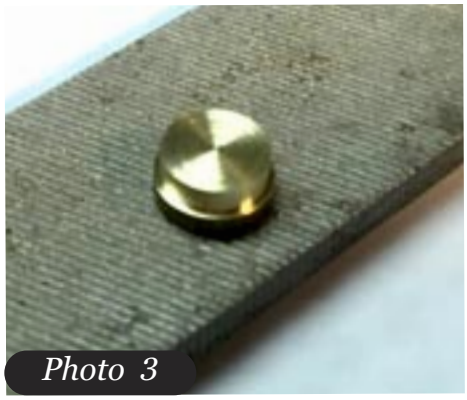


Photo 3


Photo 4

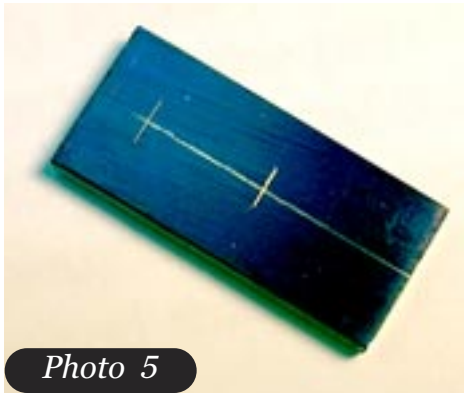


Photo 5


Photo 6

no four jaw and no collets.

A final word. There are many ways to achieve the same result. The methods I write about in this series are the way I did it. They're not necessarily the right way (if there is a right way), but they are what worked for me. If you see a better way, go for it. So, with that, let's get to it. Refer to the drawings **(Figures 1 & 2**) for dimensions on all parts.

The steam motor

We'll start with the prime mover — the steam motor. The **cylinder** is made from a piece of quarter-inch K&S brass tubing, one inch long. Paint a little layout die on the tube or use a marker, then scribe a line one inch from the end. You can cut the tube by holding it gently in the lathe chuck and cutting it with a sharp-pointed tool (**Photo1**). After the cylinder has been cut off, finish the cut end with a flat file or sandpaper. Make sure there are no burrs left on either end, inside or out.

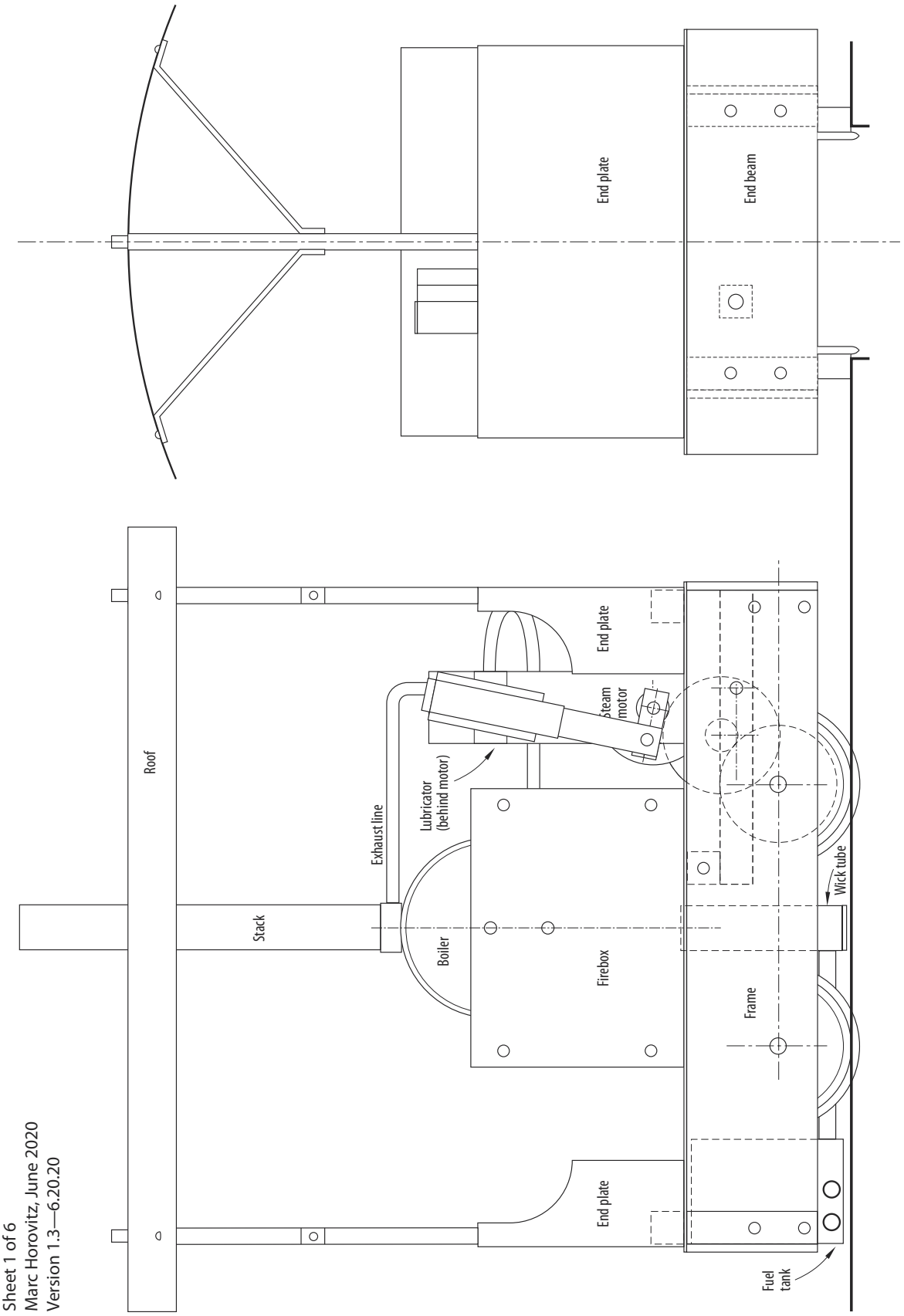
The **cylinder head** is next, made from quarter-inch round brass bar stock. Chuck it up in the lathe and turn down the end, 1/16th-inch in, until it is a good fit inside the tube you just cut (**Photo 2**). Then part it off one-eighth inch from the end. Sand or file off any burrs (**Photo 3**). This goes for any part turned on the lathe—always get rid of the burrs, leaving a smooth, clean finish.

Use 3/32-inch diameter brass or steel rod for the **trunnion**. Simply cut off a piece 0.990-inch long (**Photo 4**).

The **port face** is next, made from one-eighth inch-thick brass plate. Mark out the outside dimensions according to the drawing, then cut and file the piece to size. Using two straight sides square to each other as data, mark the placement of the two holes (**Photo 5**), then carefully center punch and drill them as specified all the way through. Ream the larger hole with a 3/32nd-inch reamer. One side of the port face must be sanded very flat and smooth. To do this, lay a piece of 400-grit sandpaper on a dead-flat surface. A piece of plate glass is good (**Photo 6**). Then, moving in a figure-eight pattern, run one face against the sandpaper until it has been sanded all over. Then move up to 600-grit paper and repeat the process. You can take it up to 1200 grit if you like, but I find that 600 is sufficient. It will wear in quickly in any event.

A note about reamers and round bar stock. Reamers are specified for many of the parts in this project. If you don't have them, you might think about starting a collection of them. Drill bits normally drill holes slightly larger than their specified size. I have also seen bits that drill smaller holes. You might get away just using drills, but a reamer will give you a hole that's precisely the size specified. It makes for a better fit for parts and, in the case of the trunnion, will help to ensure its squareness to the port face.

Having said that, you may find that metal rods, unless precision ground, may not be precisely the size stated. They might be slightly larger and will not fit the reamed hole. If that's the case, you have a couple of op-



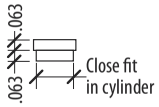
SHEET A
General arrangement
Sheet 1 of 6
Marc Horovitz, June 2020
Version 1.3—6.20.20

Figure 1

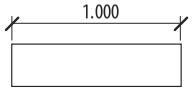
SHEET B

Motor, lubricator

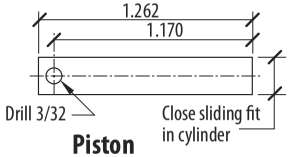
Sheet 2 of 6
Marc Horovitz
Date: 11-7-20



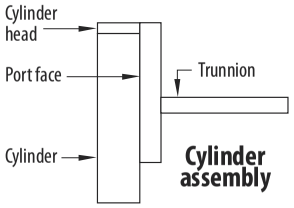
Cylinder head
Make from 1/4 round brass bar



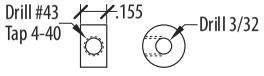
Cylinder
Make from 1/4 O.D. K&S brass tubing



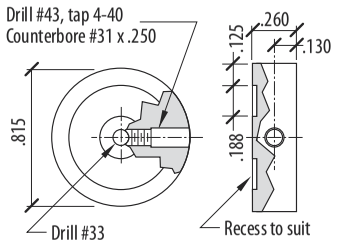
Piston
Make one of brass or bronze



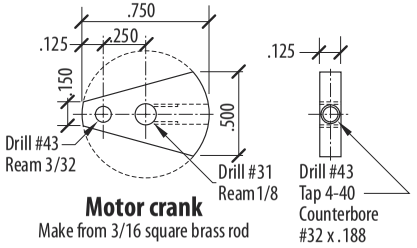
Cylinder assembly



Spring retainer
Gear retainer
Make 2 from 1/4 round brass

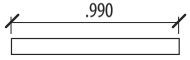


Flywheel
Make from brass or steel

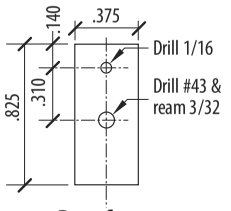


Motor crank
Make from 3/16 square brass rod

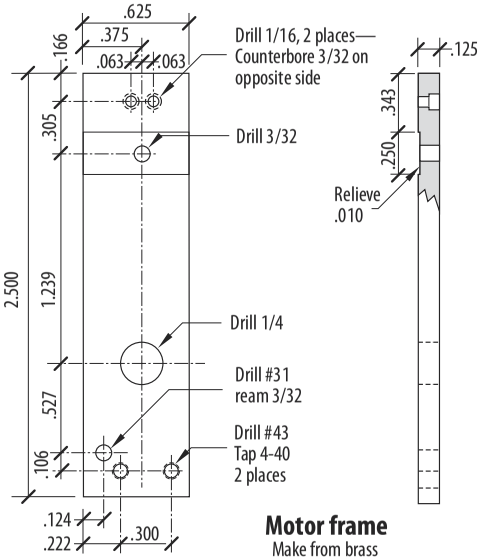
Motor crankpin
Make one from 3/32Ø brass or steel



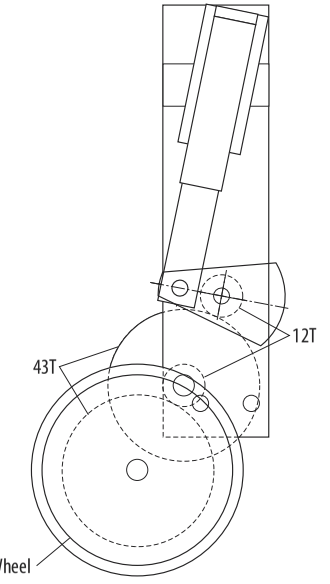
Trunnion
Make one from 3/32Ø brass rod



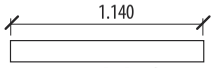
Port face
Make from 1/8 thick brass



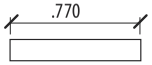
Motor frame
Make from brass



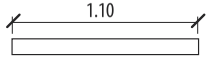
Gear arrangement



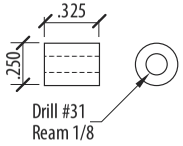
Crankshaft
Make one from 1/8Ø brass or steel



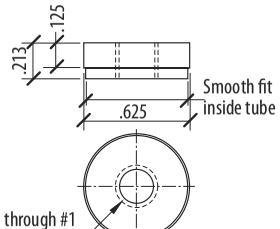
Gear-shaft sleeve
Make one from 1/8Ø brass tubing



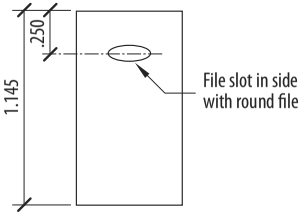
Gear shaft
Make one from 3/32Ø brass or steel



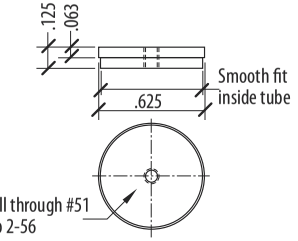
Crankshaft bearing
Make one from brass



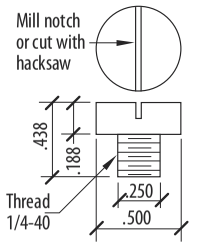
Lubricator top
Brass



Lubricator body
Cut from 5/8"- brass tube



Lubricator bottom
Brass



Lubricator cap
Brass

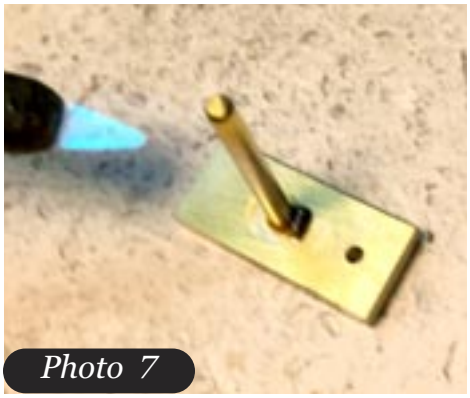


Photo 7

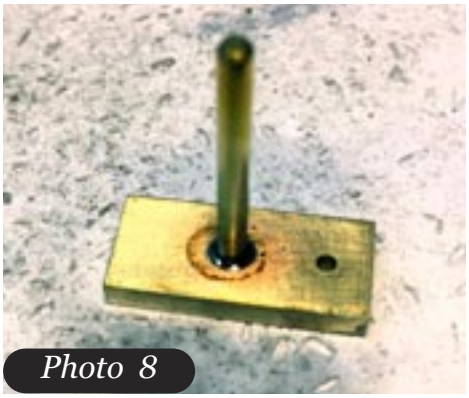


Photo 8


Photo 9


Photo 10


Photo 11


Photo 12

tions. One is to buy an oversize reamer. I have one that is 0.126-inch, which has come in handy for just this eventuality. Alternatively, depending on the circumstances, you could simply put the rod in the lathe and, with the lathe running fast, sand it a little until it fits.

Now it's time for the first assembly. Soft solder the trunnion into the large hole in the port face. The trunnion should stick out on the same side of the port face that you polished. Use very little solder, as you don't want any lumps around the joint that must be cleaned up. Set the port face on a flat soldering surface (I use a fire brick) and flux the trunnion end and also the hole. Put the trunnion in the hole and place a very small amount of solder next to it (**Photo 7**). I use 1/32nd-inch diameter solder, and a piece around 1/16th-inch long is all that's required. Using a torch with a small flame, heat the port face on the side opposite the bit of solder. Solder always flows toward the heat. Try not to heat the trunnion—let the larger port face transfer the heat to it. As soon as the solder flashes into liquid, remove the flame and you're done. **Photo 8** shows the finished joint.

Next, solder the cylinder head to the cylinder. Again, use a minimum of solder. Flux the mating surfaces of the two parts, lay them down and put a small piece of solder on the joint (**Photo 9**). Gently heat the parts evenly until the solder flashes.

Soldering the cylinder to the port face is a little tricky. The cylinder needs to be held in the center of the port face. The way I did it was to flux the mating surfaces, then bind the cylinder assembly to the port-face assembly with soft iron binding wire (**Photo 10**). Make sure that the top of the cylinder is even with the top of the port face. By carefully measuring the distance from the side of the cylinder to the edge of the port face on either side, you can get pretty close, which will be good enough. Worst case, you might have to solder it again. A good friend of mine, an experienced machinist, says that anything worth doing is worth doing twice.

Gently heat the assembly evenly with your torch. Feed the solder in by hand, being pretty generous. You want to build up a good fillet of solder. If the assembly is being heated evenly, the solder should flow to both sides. The finished assembly should like **Photo 11** after cleanup.

The last thing to do on this assembly is to drill the port through to the cylinder (**Photo 12**). There will be a little burr left on the inside of the cylinder. The best way to get this out is to take a piece of tubing the next size down and push it carefully into the cylinder until you feel the burr break away. Once you've successfully done this, you'll have completed one of the more difficult parts of this project.

The **piston** is next. Chuck up a piece of quarter-inch diameter brass bar. Center drill it with a medium-size center drill. Then extend the work piece out from the chuck around 1-3/4 inch. The free end will have to be supported by a live center held in the tailstock (**Photo 13**). Then turn the piece down so that it is a smooth sliding fit in the cylinder. The piston should fit smoothly without binding, but not so that you can detect any


Photo 13

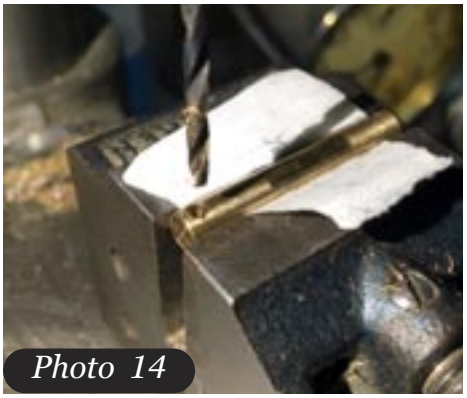


Photo 14


Photo 15

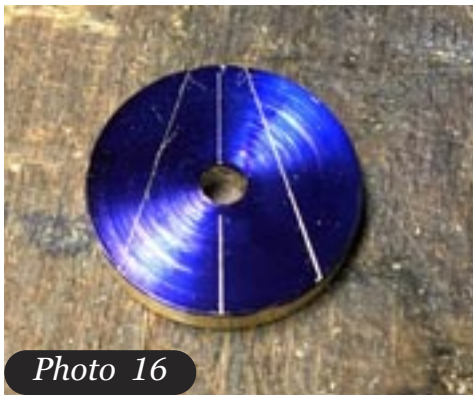


Photo 16

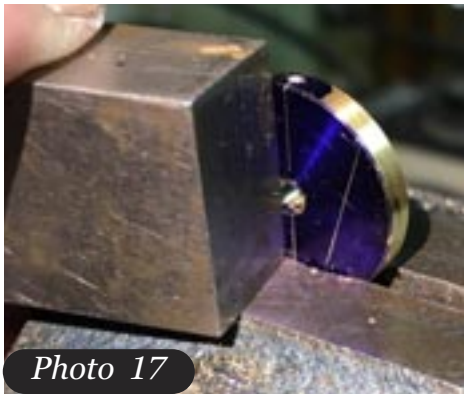


Photo 17

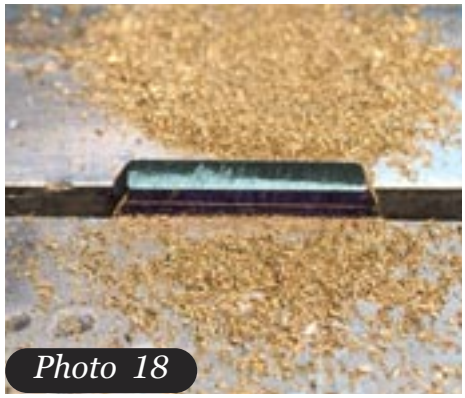


Photo 18


Photo 19

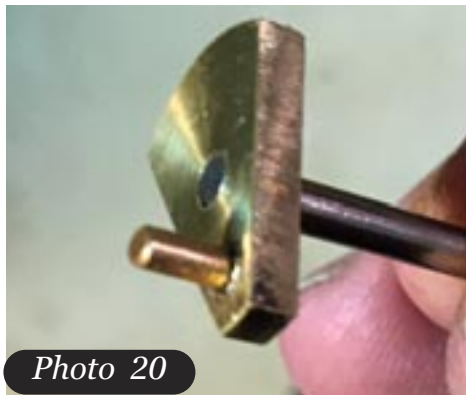


Photo 20


Photo 21

looseness. When you're turning, just get close—then creep up on it, taking off maybe 0.001-inch at a time. When you're really close — when the piston will just start to go in — then finish up with 600-grit sandpaper until the piston slides smoothly into the cylinder and you're left with a nice finish. When you're there, part it off to length, being sure to chamfer the edges slightly to remove burrs.

Hold the piston in your drill press vise with a piece of paper between the piston and the vise jaws. Then carefully measure, mark, and center-punch it for the cross hole. Drill the hole 3/32-inch (**Photo 14**). The finished piston in the cylinder can be seen in **Photo 15**.

The **motor crank** is made from three-quarter inch diameter brass or steel stock. Chuck up a piece and center drill it, then drill #33 by about one-quarter inch deep and ream it one-eighth inch. Then part it off one-eighth inch thick. Paint it with layout fluid and carefully mark the centerline. Then, based on the drawing, measure the disc and mark on either side of the centerline the end points of the lines that define the sides of the motor crank (**Photo 16**). Also using the centerline, mark and center punch the hole in the edge for the set screw. Hold the piece in your drill press vise, carefully aligning the centerline with true vertical (**Photo 17**). Drill #43 through to the center, then counterbore the hole with a #33 drill about 3/16th-inch deep. Tap the hole 4-40. Mark, center punch, and drill the crankpin hole #43, then ream it 3/32nd-inch.

Holding the piece in your vise, with one of the sidelines parallel to the vise jaws, file away everything down to the line (**Photo 18**). Do the same for the other side. Clean up the piece, and you're finished (**Photo 19**). Cut the **crankshaft** and the **motor crankpin** to length from their respective rods.

To solder the motor crankpin to the motor crank, flux

Photo 22

Photo 23

Photo 24

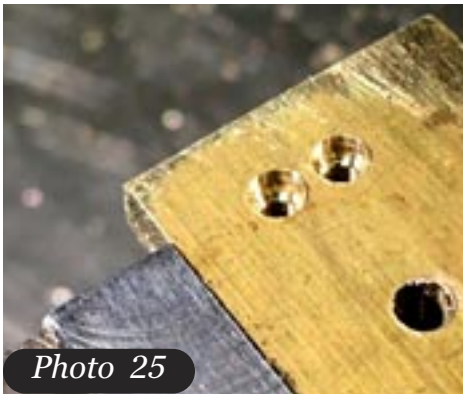


Photo 25

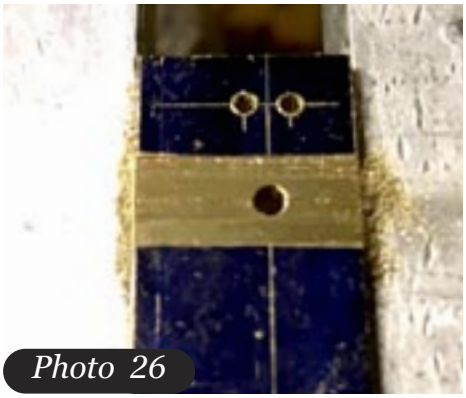


Photo 26

Photo 27

the parts and assemble. Heat the assembly well, then remove the flame and apply the solder to the joint from the backside of the shaft. If it is hot enough, the solder should immediately flow, leaving a clean joint. The crankshaft can then be installed, held in place by the set screw (**Photo 20**).

The **crankshaft bearing**, made from quarter-inch diameter brass, is a simple drilling, reaming, and parting-off job (**Photo 21**).

Now it's time to tackle the **motor frame**, a single piece of one-eighth inch brass plate with several holes in it. Mark it out slowly and carefully, double checking every line before you make it. All of the dimensions are relatively critical to the performance of the locomotive, so be very careful (**Photo 22**). Once it is marked out, drill all of the holes, reaming where specified (**Photo 23**). When drilling the quarter-inch hole, start with a smaller drill and work up to it by degrees. This will give you a more accurate hole.

Very important! When you counterbore the two holes, make sure that you're doing so on the correct side of the motor frame, as it is not symmetrical (see **Figure 2**). Either hold the work in your drill press vise or lay it flat on the drill press table. Set the feed stop on your drill press so that you drill most of the way through the plate, but not all the way (**Photo 24**). That should protect you from drilling too far. The finished counterbores are shown in **Photo 25**.

When all of the holes are as they should be, the only thing left is to relieve the area where the trunnion penetrates the plate. Again, make sure you put the relief on the correct side (the opposite side of the counterbores). If you have a milling machine, just follow the drawing. If you don't, you can use a flat file. Mark out the area to be relieved and file a small depression between the lines. These are not critical dimensions. The purpose of the relief is just to make sure there are no obstructions preventing the port face on the cylinder from lying absolutely flat against the port face of the motor frame. I used a file on mine (**Photo 26**).

When you've finished, sand each side flat. The port-face side (opposite the counterbores) should be sanded very smooth with 600-grit paper, placing the sandpaper on a flat surface and rubbing the motor frame against it.

Cut the **gear-shaft sleeve** from a piece of one-eighth inch diameter brass tubing. Cut the **gear shaft** from 3/32nd-inch diameter brass or steel rod. Set these aside for now.

To make the **flywheel**, chuck up a piece of seven-eighth inch or one-inch brass or steel. I had a piece of steel handy, so that's what I used. This is a straightforward turning job. Turn the O.D. down to 0.815-inch, as per the drawing. Center drill the end, then drill #33 about 0.275-inch deep and ream the hole one-eighth inch. You can cut a recess into the face if you like (**Photo 27**). This is purely ornamental, so do as you wish. Then chamfer the corner and part off the flywheel (**Photo 28**), chamfering the other corner before you're through parting off.

Grip the flywheel by the flat faces in your drill press chuck. Carefully measure, mark, and center punch the


Photo 28


Photo 29

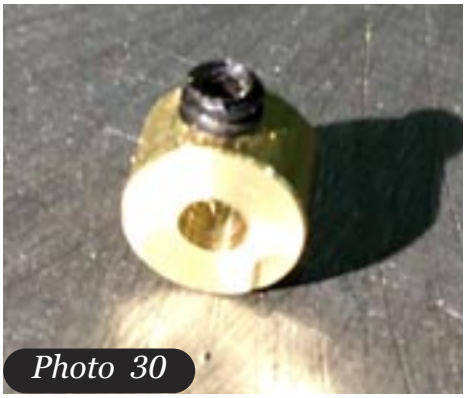


Photo 30

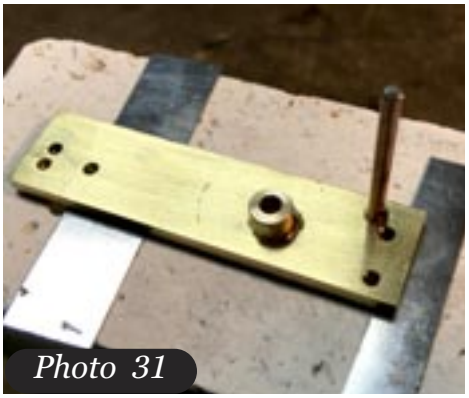


Photo 31

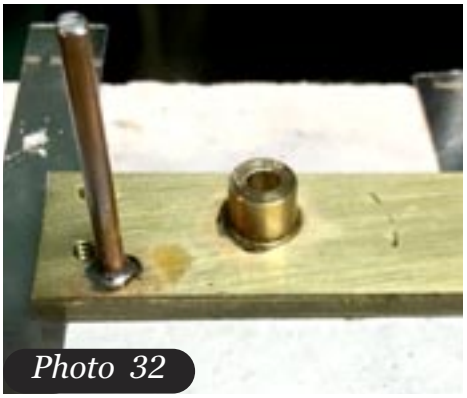


Photo 32

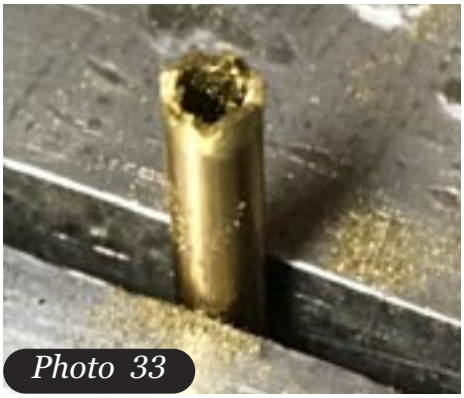


Photo 33


Photo 34

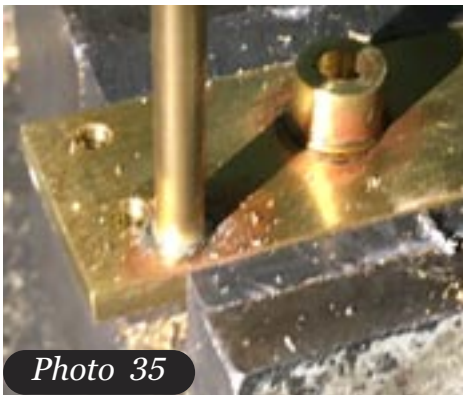


Photo 35

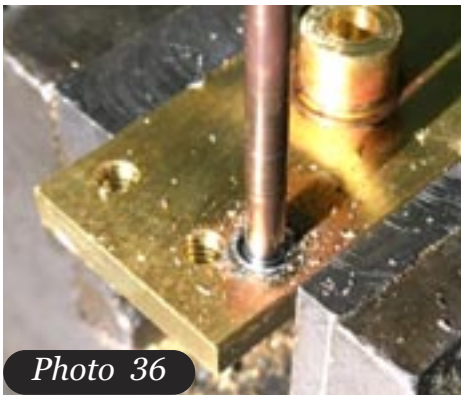


Photo 36

spot for the set screw hole. Drill #43 down to the center hole. Then counterbore with a #31 drill, a quarter-inch deep. Preset your drilling depth as you did with the previous counterbores. Then tap the hole 4-40. **Photo 29** shows the finished flywheel.

The **spring retainer** and **gear retainer** are identical parts, and very simple to make from quarter-inch rod. Chuck up the rod in your three-jaw, center drill, and drill 3/32nd-inch. Then part them off, chamfering the corners. Drill the #43 cross holes the same way you did the flywheel, and tap them 4-40. A finished one is in **Photo 30**.

Now you can assemble the motor frame, the gear shaft, and the crankshaft bearing. These three parts will be soft-soldered together. The crankshaft bearing should protrude through the backside of the motor frame about 0.010-inch. To do that, I supported the motor frame on my piece of fire brick with two pieces of 0.009-inch tinplate, one under each end (**Photo 31**), lifting the frame that distance off the brick. It doesn't matter if the gear shaft sticks out a little — it can be filed off later, if necessary.

Flux the bearing and the shaft and put them into position. Make sure the counterbore-side of the frame is uppermost. Place a small piece of solder next to each joint and slowly heat the whole piece with your torch and a small flame, working from the side opposite that on which you put the solder. When the solder flashes into liquid, immediately remove the flame. You should be left with a pair of nice, clean joints (**Photo 32**).

You can see in the photo that there is a fillet of solder around the joint that's a little bigger than I'd like it to be. That's easily remedied. Take a piece of brass tubing the next size up from 3/32nd-inch and put it in your vise, with a little sticking up. With a sharp-edge file or a thin cutoff disc in your rotary tool, cut a series of teeth around the edge of the tube (**Photo 33**). Then put the tube in your drill press and, holding the soldered frame in your vise, slip the tube over the gear shaft (**Photo 34**). Turn on the drill press and bring it all the way down to

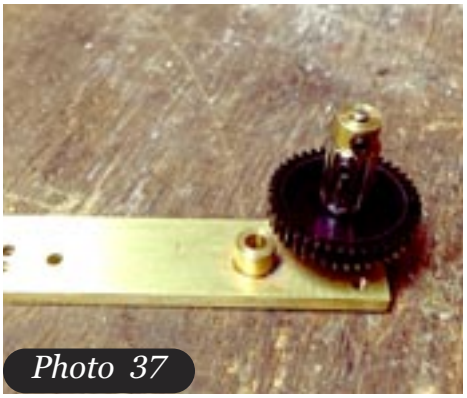


Photo 37

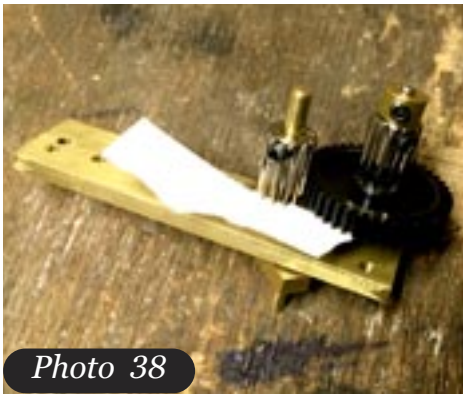


Photo 38


Photo 39

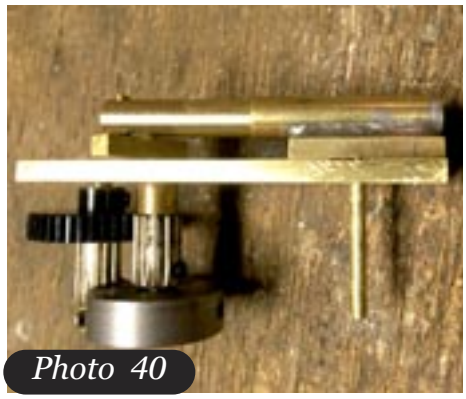


Photo 40

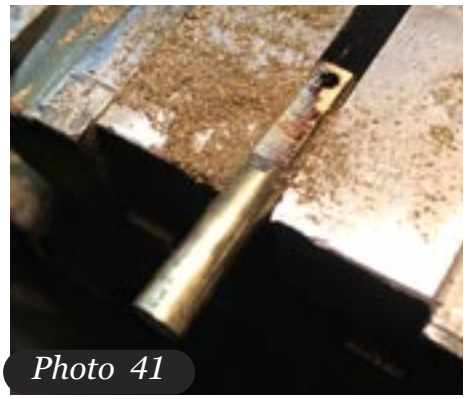


Photo 41


Photo 42


Photo 43

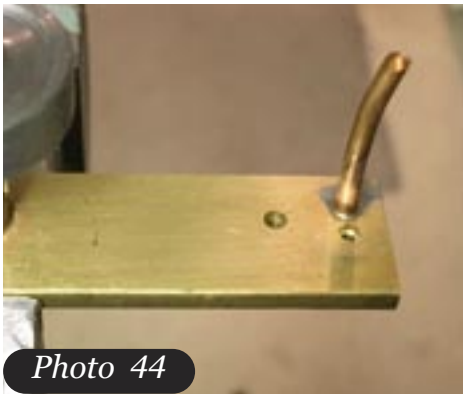


Photo 44


Photo 45

the frame (**Photo 35**). Your new tool should clean up the joint nicely (**Photo 36**).

Start assembling the parts by sliding the gear sleeve onto the gear shaft. Then put a 43T gear onto the sleeve, with the hub pointing toward the frame. The teeth should not foul the crankshaft bearing but if they do, just reposition the gear on the sleeve a little until it clears. Then put an 8T gear on the sleeve, with the set-screw end away from the frame. Finally, put the gear retainer on the shaft with a piece of paper between it and the gear, to provide just a little freedom. Tighten all of the set screws (**Photo 37**).

Put the crankshaft through the bearing from the opposite side and put an 8T gear on the shaft, with the set-screw end away from the frame. Put a piece of paper between the gear and the bearing before tightening the set screw (**Photo 38**). Add the flywheel and tighten the set screw. The finished assembly can be seen in **Photo 39**. If you did everything correctly, the gears should mesh well and the gear train rotate smoothly. In the event that you find the set screw on the lower 8T gear fouls the flywheel, just trim the set screw a little with a file or your rotary tool.

Put the cylinder/piston assembly in place as per **Photo 40**, slipping the piston end over the crankpin. The piston shouldn't foul the crankpin but if it does, just file it a little as shown in **Photo 41**.

You'll need a spring now. I used one from an old ball-point pen, cutting it in half with wire cutters (**Photo 42**). Slip the spring over the trunnion, followed by the spring retainer. Compress the spring some, but not all the way (**Photo 43**). Add a little oil to the moving parts. Everything should move smoothly.

Now comes the fun part — testing the motor. You're going to temporarily solder a piece of 3/32nd-inch brass or copper tubing into one of the counterbored steam ports. It doesn't matter which one. First remove the piston/cylinder assembly. Then grip the motor


Photo 46

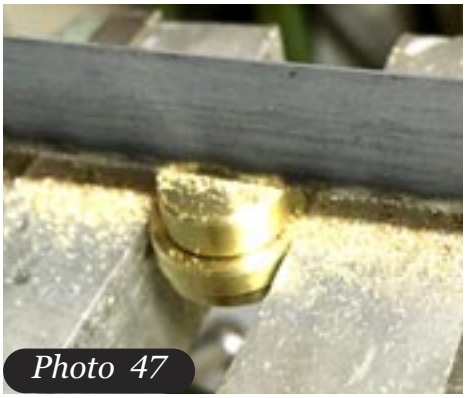


Photo 47


Photo 48


Photo 49

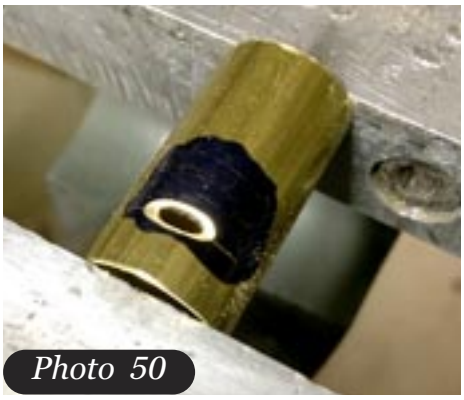


Photo 50


Photo 51


Photo 52


Photo 53


Photo 54

frame in your vise, with the end to be soldered sticking out. Flux the tube, put it in place, and put a small piece of solder next to the joint. Heat it from the opposite side until it flashes. See **Photo 44** for the soldered pipe.

Reassemble the cylinder/piston assembly. To test the motor, you'll need an air source. Even a small airbrush compressor should be sufficient, or a bicycle pump. Hold the motor in the vise and slip a rubber tube, hooked up to your air source, over it. Then turn on the air, somewhere between 10-15 psi. In any case, don't go over 20. Give the flywheel a flick (it should tell you which way) and the motor should start whizzing. If it doesn't, look for binding and/or sources of friction between moving parts — the piston and cylinder, the gears, the crankshaft bearing, et cetera. When the friction has been eliminated, all should be good. When you've got the engine running, let it go for five to 10 minutes to wear it in a little, making sure it's well lubricated. **Photo 45** shows my engine running happily on around five psi.

Now that the hardest part has been successfully done, we'll move on to the **lubricator**. It is constructed of three easy-to-make parts. Start with the body. Chuck a piece of five-eighths inch OD brass tubing into your three-jaw and, using a sharp-pointed tool, cut it to length. Remove all burrs, inside and out. A hobby knife with a #11 blade is good for cleaning out the inside.

Now put a piece of five-eighths inch bar into the lathe. Make the **lubricator bottom** first. Cut the end recess as per the drawing, so it will slip nicely into the end of the body. Center drill and drill a #50 hole, then tap it 2-56. Part off the piece, chamfering the edge.

To make the **lubricator top**, repeat the process. Drill the center hole #1 and tap it ¼-40. Part off as before. These three parts are shown in **photo 46**.

The **lubricator cap** is made from a piece of half-inch brass bar. Turn the threaded section as per the drawing, then thread it ¼-40. Part it off, chamfering both ends. The screwdriver slot in the top can be milled in or cut with a hacksaw. I chose the hacksaw method, gripping the top piece of the lubricator and screwing the cap into it. I then carefully cut the slot (**Photo 47**). **Photo 48** shows the finished cap.

A slot for the steam line must be filed into the side of the lubricator body, one-quarter inch from the top. For this, I marked the line and used a round needle file (**Photo 49**). You'll need a hole about the size of that shown (cleaned up) in **Photo 50**. Clean off the marking fluid.

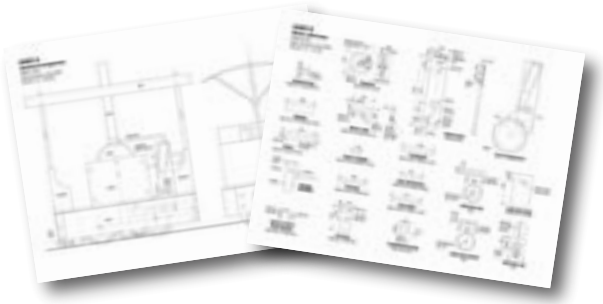
Get a brass 2-56 screw or bolt, between one-quarter inch and five-eighths inch long, and screw it into the bottom piece of the lubricator, so that the threaded part will stick out the bottom. Then solder it in place. **Photo 51** shows it from the top side, which will be inside the lubricator.

Cut a three-quarter inch long piece of one-eighth inch brass or copper tubing. Drill a #60 hole, right in the middle (**Photo 52**). This piece will be silver soldered into the side of the lubricator body. Flux the tube and the slot that you filed and, with the body supported on its side so it won't roll, place the tube in the slot. The tiny hole must face inside the body. Place a piece of silver solder about a quarter-inch long next to the joint. Slowly and evenly heat the two pieces with your torch from the side away from the solder. As soon as the solder flashes all the way around the hole, remove the heat. It should look like **Photo 53**. Pickle the assembly. Be careful when handling it now, as all of the metal will be annealed. When the flux has been cleaned and rinsed off, plug the bottom of the lubricator with your thumb and blow into the top to ensure that the #60 hole inside is clear.

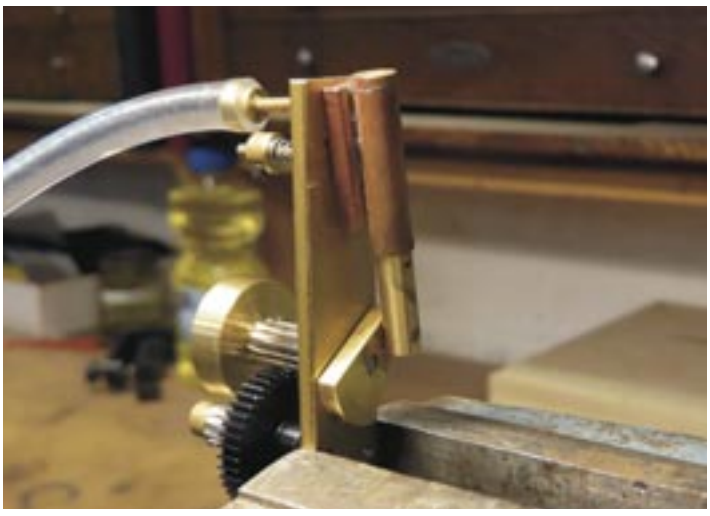
Carefully soft-solder the top and bottom pieces on. Hint: For a really neat joint, you can solder the bottom piece on from the inside. Your finished lubricator should look like **Photo 54**.

That wraps up this first part of the series. Next time we'll make some wheels and the frame and we'll mount the motor, ending up with a running chassis.

YouTube Video of Minitram



Original PDF's of the drawings for this project are available for download at:
www.steamup.com
After logging in with your User Registration, (free), follow the "Workshop Plans" menu.



Fellow live steamer Tom Winter is building along concurrently with Marc. Here are a couple of pictures showing his progress to date: Well done Tom!

Out for a run following its release from the paint shop. Marc's Minitram at home on the family garden railway.

Bob's Bit's

Weekend Projects for Steamers
by Bob Sorenson
CAD by Dan Pantages

Drilling, Taps & Dies in the Lathe


Photo 1

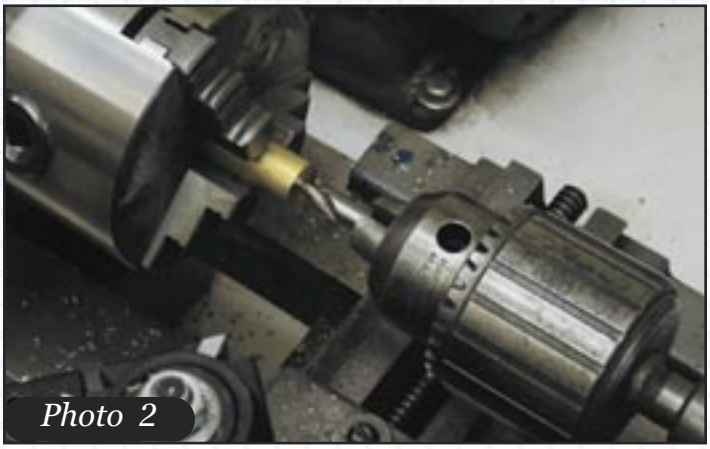


Photo 2

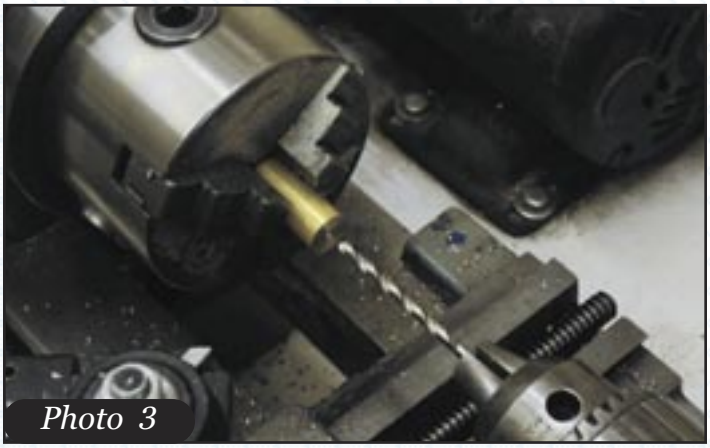


Photo 3

When Scott McDonald asked me to write some articles for Steam in the Garden, I just jumped into the deep end of the pool without any plan. So it might be a good idea to review some basics from time to time, as well as work on projects. Today's project is a look at drilling holes on the turning lathe and the use of taps and dies to cut screw threads.

Drilling holes with the lathe is a two step process: centering and drilling. **Photo 1** show the bits involved. On top is a centering bit and on the bottom is a regular twist drill. The centering bit is typically very short and extremely rigid. Its rigidity allows starting the hole without risk of "wandering" on an irregular surface. **Photo 2** shows the centering bit in the lathe tailstock chuck. Center just deep enough to get a good start for the twist drill. **Photo 3** is the actual drilling operation. Drill a little at a time. Chips accumulate quickly. They will bind the bit and break it, so back out often, clear out the chips and use oil. As for the drill bits, it is a good idea to have a dedicated, high quality set for your metal shop. Good sharp bits will drill straight


Photo 4

and leave a very clean hole.

A very common task in the lathe is to cut internal threads using a tap. A special tool called a machine mount tap handle makes this task easy. **Photo 4** shows two types of tap handles. The handle on the left is shop made, one I made many years ago. The handle on the right is a commercially made product. **Photo 5** shows the tap handle installed in the lathe tailstock chuck. Advance the tap by hand into the drilled hole. Turn the lathe chuck by hand. I say again, this is a hand operation -- no power feeding at all. Turn the lathe chuck about a quarter to a third turn. Back off fully a turn to clear the chips. Use plenty of oil. The example in **Photo 5** is a 5/16th-inch x 40 threads per inch (TPI) going into bronze. This part will become a boiler bushing. **Photo 6** shows a #0 x 80 TPI tap going into 1/8th-inch diameter stainless steel. #0 tap is about 1/16th-inch diameter and is probably the smallest tap we would use. Again, advancing the tap about a quarter turn, and backing out to clear the chips. For oil, "3-in-One" or 30 weight motor oil is satisfactory. A dedicated cutting fluid such as "Tapmatic" "Tap Magic" or "Rapidtap" is far superior. Since a drop or two is all it takes, a quart of dedicated cutting fluid will last a long time.


Photo 5

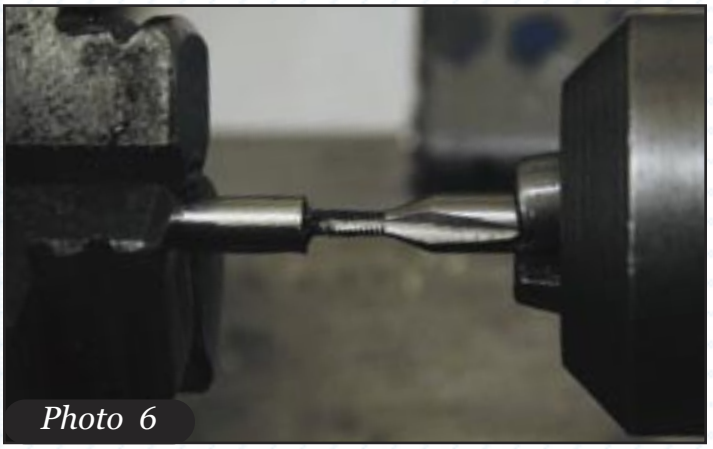


Photo 6


Photo 7

Another common task is cutting external threads using a die. As with taps, a machine mount die holder does the job. **Photo 7** shows two types of die handles, shop made on the left and commercial on the right Die handles are doubled ended to accommodate 13/16th-inch and one-inch diameter dies. **Photo 8** shows the dies handle in the lathe tailstock ready to cut a 1/4-inch x 40 TPI. As with taps, turn the lathe chuck by hand

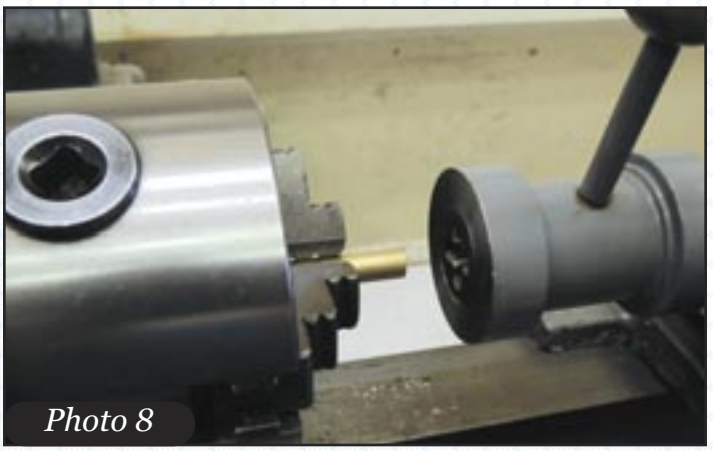


Photo 8

only. Cut a quarter turn, back off a half to clear chips and use oil. **Photo 9** shows the result, straight and true.

More often then not, the job calls for an external thread on a shouldered work piece. **Photo 10** is such a case. The thread is 5/16th-inch x 40 TPI on 7/16th-inch diameter hex stock. Notice that the thread is not cleanly cut to the shoulder. Screwing this part into its correspondent will leave a gap, the shoulder will not seat firmly. To solve this, use a narrow parting tool to undercut and remove the partial thread next to the shoulder as in **Photo 11**. This ensures a good firm seat of the shoulder.

When purchasing drills, taps and dies, I think it's a good idea to get quality. Industrial suppliers such as Travers, MSC, and McMaster-Carr carry good products in all sizes. In our hobby a fractional drill set 1/16th-inch to 1/2-inch, and a numbered set 1 to 60 is plenty of range. For taps and dies, sizes #0, #2, #4, #10 covers most of the tasks. The special sizes 1/4th-inch x 40 TPI and 5/16" x 40 TPI are for plumbing work. Purchase other sizes as needed.

Thanks. See you next time.

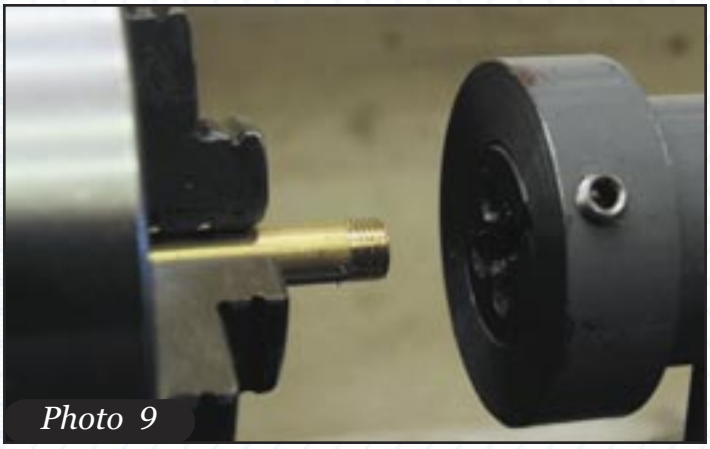


Photo 9

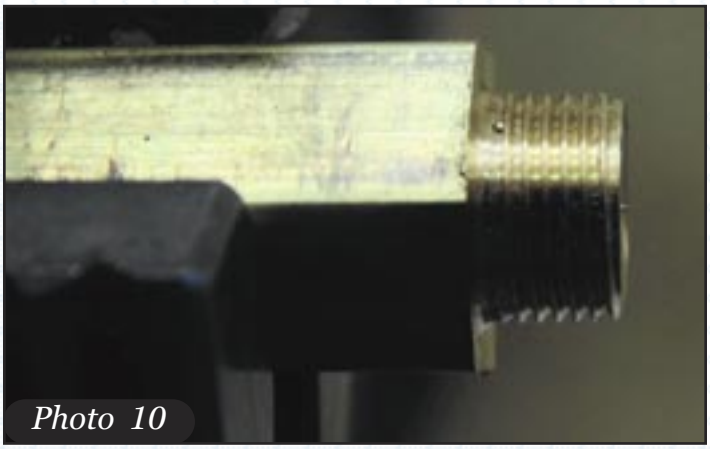


Photo 10

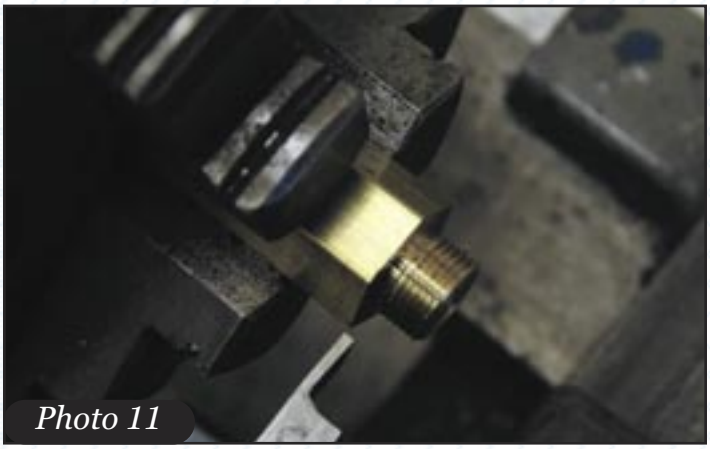


Photo 11

Project: HOW I DID IT

Author: Dave Frediani *Project: Track Blower*

1. Observation

I was tired of cleaning my track every time that I wanted to run my steam engines, so I thought that there had to be an easier way than sweeping it off or hosing it down.

I needed a car that would remove debris off of my track, whether it was leaves, pinecones, acorns or small branches that I could push with anyone of my engines regardless if they were steam powered, battery powered or electric.

Then one day I was watching a friend blowing off his drive way and it hit me that's exactly what I need. The more I thought about it, all I really needed was some kind of battery powered blower that would fit on a flatcar or any other type of car (**Photos 1 & 2**). How hard would that be?

I looked and looked but never found a blower that would fit on a flat car with the power that I thought I would need. While helping another friend with his boat, I saw a small bilge blower that's used on inboard boats to blow the gas vapor out of the bilges so they don't explode or catch fire and it was battery powered - just what I needed.

Photo 1

Photo 2

Do you have a simple tip or quick afternoon project that you want to share. Send it in to us via e-mail at sitg@steamup.com. Make sure to mention it's for "How I Did It" - editor

2. Preparation

Then it's off the local boat shop. The owner showed me a few different blowers, then I saw just what I needed, it was an Attwood 3000 turbo blower. The owner told me that this thing can blow the hair off your dog at twenty feet. What a salesman and it only cost about $25.00.

Back at the shop I started looking for other parts that I could use.

I started with a flatcar that I built out of styrene about 17" long, but any size flatcar will work as long as you have enough room to add batteries under the deck of the flatcar between the two wheel assemblies. Then I added two used two-axle trucks with wheels made by Bachmann. The blower was now ready to be mounted to the flatcar.

2. Construction

Mounting the blower was easy. I just built two half round mounting plates made out of styrene for the blower to sit on and a styrene band to hold the blower in place.

Next I used a three-to two inch ABS adapter to mate the blower to two-inch PVC pipe.

Then I used two pieces of two-inch diameter PVC schedule 40 pipe, one two & three-quarters inches long and the other piece two inches long. I cut a 30 degree angle on the two-inch piece and glued them together. This will become the nozzle for the blower which when inserted into the ABS adapter the air blast can be adjusted side to side or straight on.

For power I used two Dyna-Fun 2400 MAH six- cell batteries that I mounted under the deck of the flatcar between the trucks to keep the battery weight down low (**Photo 3**). After that I just wired the batteries to a switch and then to the blower.

This car may not be very pretty to look at but it really gets the job done.

The blower on this car will run for about twenty or thirty minutes with the onboard batteries I'm using.

Photo 3

Planning for the New Year!

I know many of us want to get rid of 2020 and move forward since so many normal routines have been upended due to the pandemic. Here at *Steam in the Garden* we have a faithful cadre of contributors who are going to help us to achieve that goal. In this issue we begin the four part series by Marc Horovitz on his whimsical Minitram, which will take us through to our May/June 2021 Issue #173. Starting in our January/February 2021 Issue #171 we will begin another new construction series by Les Knoll with a Freelance Consolidation. The 2-8-0 was a real workhorse among many railroads and affords a great opportunity for you to build to your favorite railway prototype. Les has once again brought together all of the bits and pieces to give us a "make-your-own" bolt-together kit with materials sourced from various manufacturers supporting the hobby.

Another long time contributor to SitG is Ross Schlabach, who will show us his modification of an Accucraft SPng 4-6-0 by replacing the tender with his scratchbuilt tender, turning the 4-6-0 into a RGS #20 look-alike that only recently this past year was brought back into steam at the Colorado Railroad Museum in Golden, CO. Talk about timely modelling! Plus we have more tips and hints from Bob Sorenson scheduled.

But our schedule is not completely full for next year. We still have openings for many more projects from other contributors. We hear back all the time from subscribers who are thankful that SitG is still around, but we can't do this without your help. Don't ever think that your own project "may not be good enough", it's our Associate Editor's and my job to make you shine among your peers in the hobby. No project is ever too small. Let us know what you're doing. Keep sending in pics of your activities, and lets all make 2021 the year to help us forget about 2020!

Happy Steaming!

Scott

'Cupola view' is written by Editor Scott E. McDonald: you can contact him at sitgeditor@gmail.com or P.O. Box 1539, Lorton, VA 22199.

Special or Annual Meets

Cabin Fever Model Engineering Show January 15-17, 2021 - Lebanon Valley Expo Center & Fairgrounds, Lebanon, PA. Gauge One Tracks available for steaming. Visit *www.cabinfeverexpo.com* for more information.

International Small Scale Steam Steamup. January 2021 - 103 Live Oak Drive, Diamondhead, Mississippi. Visit *www.diamondhead.org* for more information.

Staver Locomotive Spring Steamup 2021 — Staver Locomotive, Portland, Oregon. Visit *www.staverlocomotive.com* for latest information.

Fourth Annual Gathering of North American Members of the Association of 16mm Narrow Gauge Modellers - 2021. Venue will be in Northwestern Ohio. Visit *www.northamerican16mmmodellers.org* for registrations and venue information.

National Summer Steamup, July 2021 - Lodi Grape Festival and Events Center, Lodi, California. Visit *www.steam-events.org* for more information.

Regular steamups

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

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*.

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 Comley at (253) 862-6748.

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

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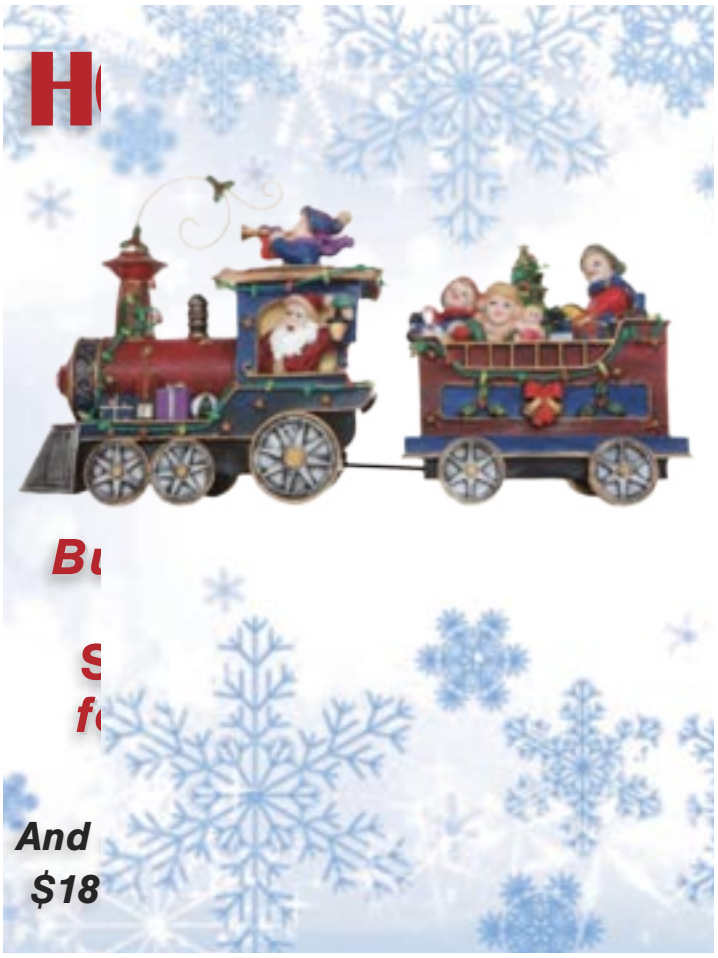

CONTRIBUTOR BIOS

The magazine couldn't exist if it were not for the dedicated individuals who take time from the hobby to chronicle their endeavors, interests, and joy of live steam. If you get a chance to meet any of our contributors at a steamup, please thank them for their contribution.

Bill Allen - Bill lives in Woodside, California and first became interested in live steam in 2008 when he saw Richard Murray's layout at a BAGRS open house. He proceeded to buy a Ruby, C16 and Forney before deciding to start building his own. He bought a mill and lathe and with the help of some BAGRS members learned to use them and was soon making chips. Since then he has completed 20 projects some of which have been featured in Steam in the Garden and currently has a multi part article running in Live Steam. All of his builds are one-of-a-kind as he only builds those which have never been done before and probably will never be done again in G gauge live steam. Bill's prior hobby was building fine furniture and he uses some of those skills and tools in hie engine building.

Greg Dahlem - Greg was born, raised and continues to live in Santa Monica, California. Since childhood, Greg has found trains fascinating but wasn't until after his retirement from banking in 2012 that he was able devote time to this hobby. At a local toy train show he was introduced to the live steam hobby by the late Bill Turkel and Dave Passard. Soon Greg was attending weekly steamups at Jim Gabelich's home. Greg's collection is eclectic, ranging from Aster mainline engines to narrow gauge Shays and now road engines and steam boats.

Dave Frediani - Dave started with L.G.B. trains about thirty five years ago. Shortly after that he received a used Mamod locomotive from a friend and fooled around with it for a year or so but soon lost interest in it. About eighteen years ago he bought a Accucraft two-truck Shay and that started it all. He never looked back. He really enjoys the hands-on of live steam and all the people he's met along the way. Dave never grew up with model trains, it was always motorcycles that he grew up with. He first retired from his motorcycle dealership in the late eighties, and then from his bicycle dealership two years ago.

Marc Horovitz - Marc has been interested in steam locomotives — both large and small — all of his life. In 1979 he opened the Light Railway Division of his existing business, Sidestreet Bannerworks, for the purpose of importing small scale live steamers in the U.S. Sidestreet Bannerworks was the original US importer of the Beck Anna and other Beck locos. Marc began writing the "Small Scale Live Steam" column for LIVE STEAM magazine around 1980, and continued on for five years or so, until Garden Railways magazine began to evolve. He has kit-bashed and built many steam locomotives.

Rob Lenicheck - Being a Colorado native, Rob Lenicheck was born with narrow gauge steam in his blood. He started modeling in HO in junior high, thanks to a suggestion from a "friend", moving on to HOn3 in high school, and finally to On3 in his early twenties. Unknown to Rob at the time, the Gauge One live steam hook was set deeply about 20 years ago when that same "friend" revealed his collection. Rob now spends much of his time scratch building engines. He has degrees in Music Education and Mechanical Engineering.

Sonny Wizelman - Sonny Wizelman lives in Los Angeles, California. Sonny is a longtime live steamer who has more than 50 years experience in printing and publishing and is the advertising manager for *Steam in the Garden*. As a contributor to Steam in the Garden, Sonny has written extensively about detailing locomotives and rolling stock and has done a locomotive review or two. Sonny aided and abetted in the establishment of the National Summer Steamup and continues to support the LLC that runs that annual event since 2002.

Advertiser Index

Coming Soon!
Issue #171
January/February 2021

New Build Series
Freelance Consolidation
by Les Knoll

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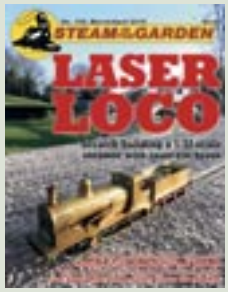
Vol. 26, No. 1; Issue 143; Jan./Feb. 2016
Micro layout: Building an indoor Gauge One track • Review of Wuhu Bowande Porter • Hot-rod 'Ruby': Hopping up a 1:20.3-scale engine • Rolex Asters: Adding radio control • Learning to model in tinplate with a 'Dora' modification, Part III • Latest waybill: Llagas Creek Railways sold, U.K. distributors merge.

Vol. 25, No. 6; Issue 142; Nov/Dec 2015
In memoriam: Andre Anderson, Wuhu G5: Locomotive review — 1:32-scale, 4-6-0 , Topaz: Alchemy, building an Accucraft 'Ruby' kit, Tram: Learn to model in tinplate, Sacramento stationaries: NSS 2015 highlights miniature machinery. WWI car: Creating a 7/8ths-scale Fort Benning railroad observation car.

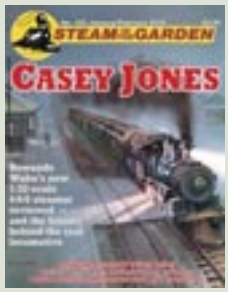
Vol. 25, No. 5; Issue 141; Sept./Oct. 2015
Mamod's latest: 'Brunel' • Learning to model in tinplate with a 'Dora' modification, Part I • Live-steam group makes sixth appearance at Maker Faire • Adding mesh to Accucraft burner • Salute to Tom King • New products: Aster 0-4-0, Wuhu Bowande German 2-6-2T, 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 rail bus • 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: Diamondhead 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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