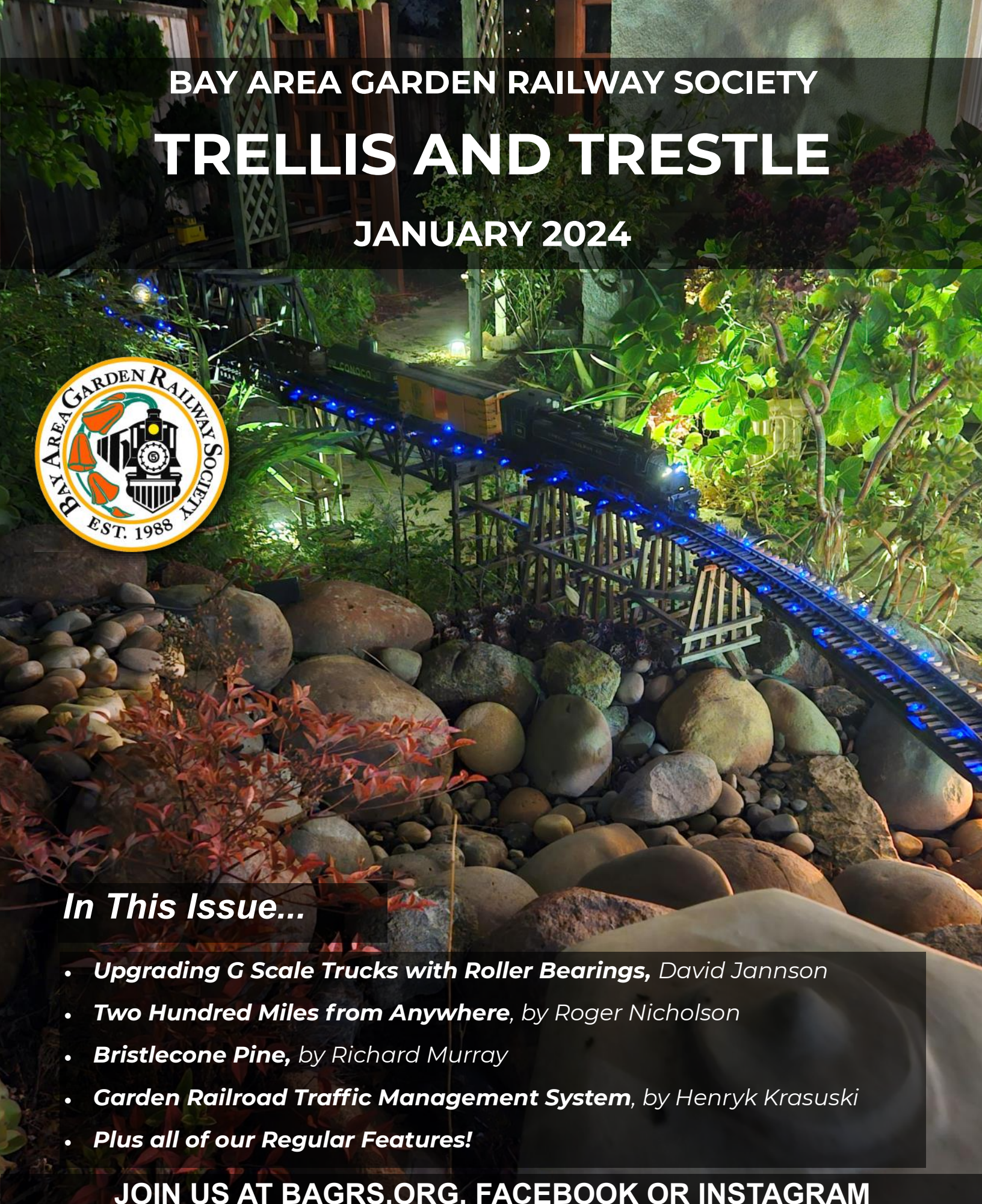
BAY AREA GARDEN RAILWAY SOCIETY

TRELLIS AND TRESTLE

JANUARY 2024



In This Issue...

JOIN US AT BAGRS.ORG, FACEBOOK OR INSTAGRAM

PRESIDENT'S PERSPECTIVES

HAPPY NEW YEAR
WE ARE LOOKING FORWARD TO 2024

THANK YOU
250 memberships renewed on time. That is a higher percentage of memberships renewing on time than in the recent past, and their timeliness is greatly appreciated.

OVERDUE MEMBERSHIPS
Members who did not pay their 2024 by December 31 are officially 'overdue.' They will receive the email on the next page in the next 48 hours.

MEMBERSHIP SURVEY
In December, we sent members who responded to the survey some results snapshots. This month, the Board of Directors will review the full results. We will share them at the March Annual Meeting, then release a written report to all members.

FROM DISTRICTS TO AREAS
BAGRS 11 Districts have served as the basis for scheduling open railroad weekends. With the move to more flexible open railroading scheduling, we will transition from 11 Districts to a smaller number of AREAS, where the emphasis will be on social networking for members and the integration of new members.

One of the joys of garden railroading is the opportunity to spend time with other garden railroaders, socially, running trains together and exchanging experience and ideas. While we cannot organize social events covering all of BAGRS from Monterey to Forestville, we believe that social events can be organized in smaller areas. We are working out the details, which we hope to share in February.

TOP 2023 POSTS
I am writing this before heading out of town for Christmas, so will share top images and video posts next month, but here are two more in the running.

MEMBERSHIP RENEWAL EMAILS

On January 3, memberships that have renewed will get a simple thank you. Memberships that have not renewed with receive the email below.

THE 2024 BAGRS MEMBERSHIP RENEWAL TRAIN

HAS LEFT THE STATION !

THE BAGRS RENEWAL TRAIN LEFT THE STATION 2 DAYS AGO

BUT GOOD NEWS: WE HAVE SCHEDULED ANOTHER ONE

It's departing on January 31

And until then you will get updates and the February *T&T*

IF YOU MISS THAT ONE: YOU WILL NOT BE GETTING

Future T&Ts nor other BAGRS updates

The option to register for the 2024 Annual Meeting in March

Members in Good Standing can register for the Annual Meeting, and the practice of paying dues at the Annual Meeting has been discontinued. Now it is held in March, not February, as used to be the case.

YOU CAN CLICK THE LINK BELOW TO LOGIN TO YOUR MEMBER PROFILE WHERE YOU CAN PAY YOUR 2024 DUES

www.bagrs.org

TO SUMMARIZE

All memberships continue to get full membership benefits thru January 31.

Memberships that now renew by January 31, will get continued, uninterrupted, full membership benefits.

Memberships that do not renew by January 31, will not get any membership benefits until they renew; no *T&T*s, email updates, open RR/Swap Meet/Estate Sales notices, until they pay their 2024 dues.

Nor will they get an invitation nor be able to register for, nor attend the BAGRS Annual meeting in March, which is open only to 'members in good standing.'

This is how things were supposed to work all along but were not entirely followed while the Annual Meeting was in February.

Now the Annual Meeting is in March: the online renewal process is working smoothly and the option of sending a check is well-publicized. We are doing things the way they were always intended, and will not be processing members renewals at the Annual Meeting.

If you need renewal help, you can contact any one of us

Ray Turner : membership@bagrs.org or **Roger Nicholson** : communications@bagrs.org

Or **Mick Spilsbury** : president@bagrs.org

From the Editor's Desk

Roger Nicholson lives in Union City, California, and operates the *Crystal Cove & Rose Railroad*.

- **Welcome to 2024!**
- **On the Cover.** A rare night run on the *Crystal Cove and Rose Railroad* as the Trick-or-Treat train carries a load of candy out to the front yard on Halloween. The blue marker lights are there so that the kids can see where the track is (and where the candy train will appear) in the dark. Not prototypical, I know, but it works. During my open house in 2022, Richard Murray made me *promise* to build a proper bridge over that stream bed. Yes…yes…it's still on my list!
- **Rob Lenicheck** takes over the reigns of the "All Steamed Up" column from Richard Murray with a report on the November 25th steamup.
- **What goes around comes around.** I recently attended the December General Meeting/Potluck/Swap Meet of the *Sacramento Valley Garden Railway Society*. I was sitting at a table eating with Jim Ralph and Jeff and Suzy Namba when Jenni and Cody McWilliams joined us at our table. She and her son had joined the SVGRS just a few months earlier. I handed her my business card for the *Crystal Cove and Rose Railroad* YouTube Channel, which she recognized immediately, telling me that it had popped up on her YouTube recommendations. She told me that they were quite familiar with my YouTube channel, which had led them to the BAGRS YouTube channel. The BAGRS videos were all advertising the 2023 NGRC, so they decided to attend. That ultimately led to them joining SVGRS. (I was in the process of making a joke about which club they joined until I remembered that I am a member of the SVGRS as well. I really have to remember to "change hats"…)
- **We have two "Garden Department" articles in this issue.** First, we have a reprint of one of Richard Murray's excellent "Plant of the Month" series, and second, Russ Miller has located an online archive of great plant information in *Rock Garden Quarterly*.

- **I received a fun surprise in the mail.** Jim Ralph (Bill's brother) sent me this 3D printed Doggie Diner head. I have fond memories of seeing this landmark on the Doggie Diner in San Leandro years ago, and now I have one of my own! Jim is writing a series of articles on his collection of "Carnivale" cars for the Sacramento club, and the series will be reprinted in its entirety in the *Trellis and Trestle*, starting with the February issue. One of Jim's Carnivale cars is the "Doggie Diner" car. I guarantee that there will now be a "Doggie Diner" presence somewhere on the *Crystal Cove and Rose*, (which may be beginning to resemble the "Land of the Lost.")

Roger

WELCOME NEW MEMBERS

We would like to welcome BAGRS' newest members and invite you to tell us something about yourself. We are happy that you decided to join us, and we hope that you will enjoy getting to know other members. Remember, you do *not* have to have a garden railroad to contribute to BAGRS or the *Trellis & Trestle*—approximately half our members do not have their own railroad. Also, if I get some information wrong or misspell your name, please let me know and I'll take care of it.

If you would like to submit an article, member update, fun train-related thing you saw while traveling, open house you visited, photographs, videos, or have any questions or corrections, please contact me (Roger Nicholson) at communications@bagrs.org.

- **Thomas and Mary Cairns**, Lemon Cove, California. Joined 15 Nov 2023 Railroad Name: *Lemoncove Express*.
- **Andrew, Heather and Slade Trotter**, Salinas, California. Joined 27 Nov 2023. Railroad Name: *Prunedale Pacific*.
- **Bill and Gail Baxley**, Pleasanton, California. Joined 8 Dec 2023.
- **Meaghan Andrews and Rob Springer**, Campbell, CA. Joined 9 Dec 2023.
- **John and Kathy Taecker**, Campbell, CA. Joined 14 Dec 2023.
- **Shubham Mankhand**, Pleasanton, CA. Joined 16 Dec 2023. Railroad under construction.
- **Bill Hughes**, Morgan Hill, CA. Joined 31 Dec 2023

THE MECHANICAL DEPARTMENT

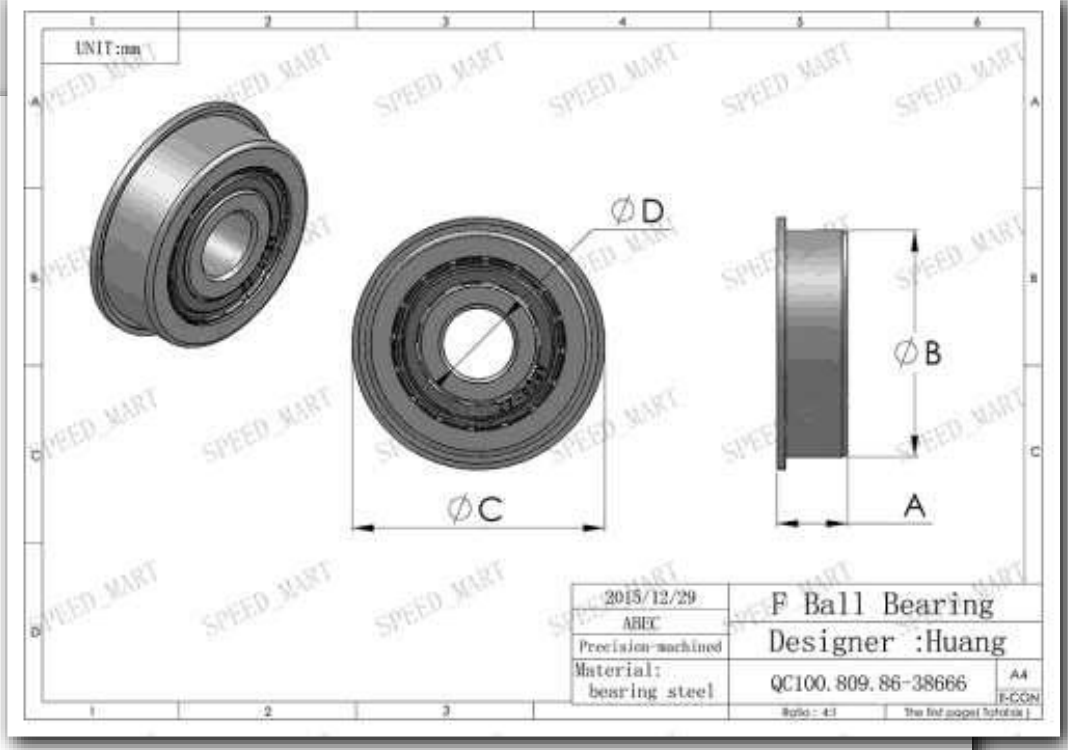
Upgrading G Scale Trucks with Roller Bearings

Text reprinted from the SVGRS *Valley Flyer*, February/March 2021

Text and photos by David Jannson

Most G scale cars come with plastic wheels and trucks. The axles are typically plated brass or steel, and the end track frames have a plastic insert bearing. Replacing these wheels with metal ones improves the weight of the car and improves tracking but the metal axle and plastic bearing are retained. This is fine for normal operation with little real load on the car. But adding weight (like a typical carload) can impact the car's performance as the plastic bearing will wear down and eventually fail. This can be dealt with by swapping out the plastic bearing for metal roller bearings. Roller bearing trucks from several vendors are available but they're NOT cheap. I found a way to do this with a little work, and at a very affordable cost. The following pictures show what I do. The following items are required:

- MF63zz Mini Metal Double Shielded Flanged Ball Bearings (3mm*6mm*2.5mm)
- Drill bit 15/64",
- Small jewelers' files
- X-acto knife
- Clamping pliers
- Shrink tubing 1/32" w/nippers



Like anything mechanical, these bearings will need a little care from time to time, depending on usage. As shipped, there is a light film of oil in the bearing and that should be OK for the first several hours of running (your mileage may vary). I recommend a tiny drop of Labelle oil or light grease into the bearing after a period of running. It's always a good idea to spin the wheels from time to time to see how they turn.

A typical truck has two side frames, two wheelsets, and a bolster, held together with two screws. We will add four small roller bearings shown here. Some trucks have small springs, which require gently removing them (small tweezers will do this) but the side frames are the same.

The bearings must slide on the axle, but the typical axle is a fraction too large. Using a jeweler's file, VERY GENTLY file down just enough metal to slide the bearing on the axle. Note that the axle will NOT ROTATE WITHIN THE BEARING so a snug fit is ok.

So far, so good. But here's an issue: most metal wheels are insulated from the axle by a plastic sleeve, and if the bearing is snug against the wheel it will short it out. NOT GOOD. To prevent this I use a small snip (1/64" or so) of shrink tubing as an insulator. We are not mounting the bearing on the axle here; the bearing will be press fitted into the side frame.

This shows the wheelset ready for mounting with the small piece of shrink tubing on the axle.

Note the plastic bearing insert, which is an insert you will drill out. It will peel out cleanly with slow drilling. Be careful just to remove this bearing.

This is the side frame with the plastic bearing removed. You might want to make sure the edges of the hole are clean from any flash or residue. Use a cotton swab to wipe out any contamination from the hole.

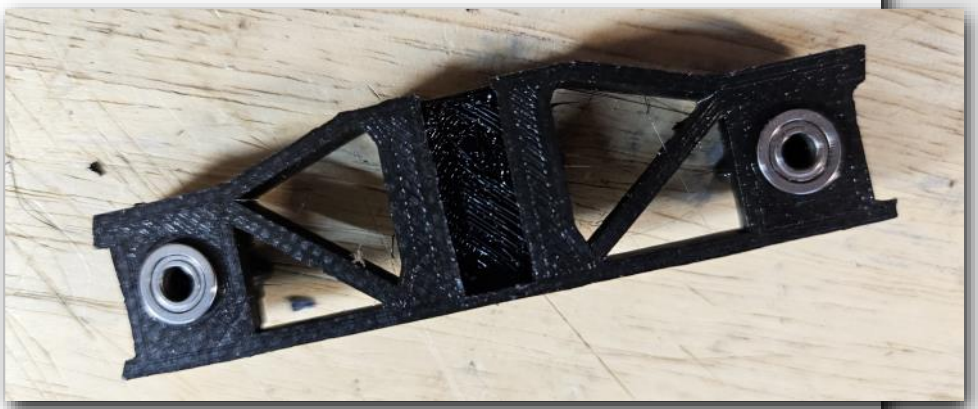
The new bearings seated in their holes. They will need to be seated using clamping pliers. Do not use too much force—the bearing will pop into the hole if lined up and a small amount of direct pressure is applied. Be sure that the bearing is fully seated.

Seat the axles into the new bearings and reassemble the truck. Make sure the wheels spin freely! The truck is now capable of bearing a load and your car (both trucks upgraded) is now capable of generating some real revenue for your Railroad! ■

A FOLLOW-UP FROM THE EDITOR

I was intrigued by this article and decided to try it myself, with one difference: I would 3D print the bolster and side frames and modify the design to accept the bearings directly. This would significantly reduce the chance of 3D printed plastic bearings from wearing out, which is something I am definitely worried about. I used an existing design for the 3D printed trucks that I downloaded from Thingiverse several years ago and modified it accordingly. The results appear to be quite functional, as you can see in these photos.

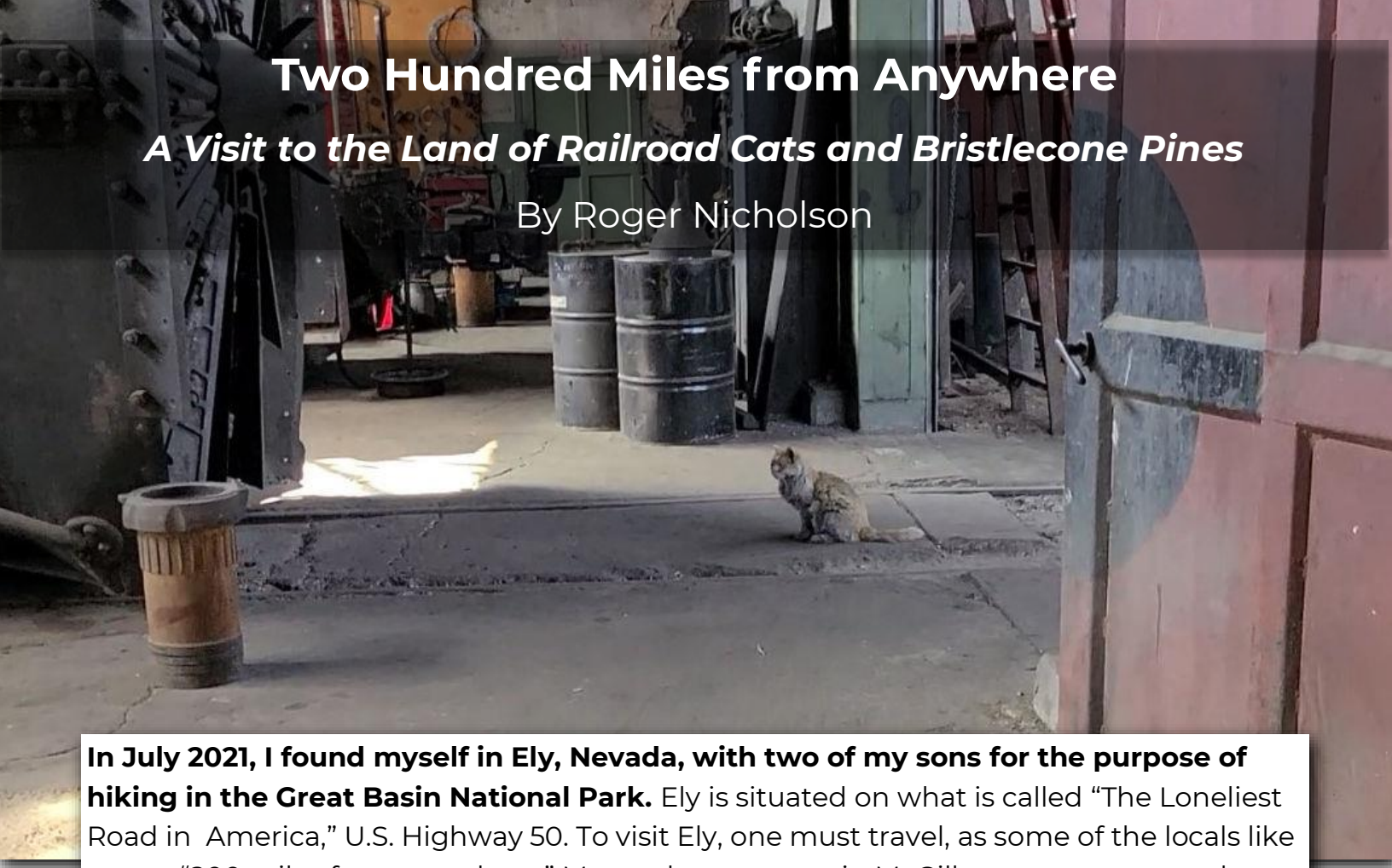
(I would love to give credit to the designer of the 3D printed trucks, whose design I have modified several times over the years, but they seem to have removed their design from Thingiverse since I downloaded it a couple of years ago. If I identify them, I'll give credit where credit is due.)



Two Hundred Miles from Anywhere

A Visit to the Land of Railroad Cats and Bristlecone Pines

By Roger Nicholson



In July 2021, I found myself in Ely, Nevada, with two of my sons for the purpose of hiking in the Great Basin National Park. Ely is situated on what is called "The Loneliest Road in America," U.S. Highway 50. To visit Ely, one must travel, as some of the locals like to say, "200 miles from anywhere." My mother grew up in McGill, a company town that was owned by Kennecott Copper, which was located about 12 miles north of Ely. According to my mother, my grandmother used to ride the train from McGill to Ely every day to attend high school.

Great Basin National Park is famous for the *Bristlecone Pine*, which you can learn all about by reading this issue's Garden Department article by Richard Murray, which is cleverly named, "Bristlecone Pine." However, I'll tell you this: in order to see them, you have to hike UP the mountain to a certain elevation, and they are *really* old. Even the dead ones are impressive.

On the morning of the second day of our visit, before we were due to return to Las Vegas, I visited the **Northern Nevada Railway Museum**. I paid for a self-guided tour, which allowed me to wander the property, and in particular, the engine house. I was lucky enough to be visiting the engine house while shop workers were in the process of steaming up No. 93, a 2-8-0 Consolidation built in 1909.

Among the relics was a massive rotary snowplow. And next to that snowplow, living in the most decrepit looking caboose imaginable, were two cats. One of them looked like he had been working on a locomotive all day, or, perhaps, for several months. I asked one of the shop workers about the cats, and he explained that the older cat, named “Dirt,” had been born in the shop and had lived there all of his life. Dirt was the “Boss Cat” in the shop, and his protégé was “DJ,” or “Dirt Junior.” They had the run of the place, and were treated as job supervisors.

What I did not know at the time, was that Dirt was *famous*. He had become an internet sensation back in 2018, and people would drive 200 miles out of their way just to see him on a tour. I didn't know any of this until after I returned home to California. I was in the presence of a famous cat, and didn't even realize it. No wonder Dirt was giving me "the look!"

I did not have time to ride the excursion train before we had to leave, although I wish that I had. Sadly, I recently learned that Dirt passed away from old age in January 2023. A funeral was held, and two cast bronze statues of Dirt were created—one sits over his resting place in the museum plaza, and the other watches over the engine house. DJ remains on the job and carries on the tradition set by his mentor, Dirt the Railroad Cat. ■

THE GARDEN DEPARTMENT

Bristlecone Pine

By Richard Murray

BOTANICAL NAME: Pinus aristata 'Sherwood Compact'

COMMON NAME: Bristlecone pine 'Sherwood Compact'

USDA ZONE: 4a (down to -30F)

In nature the full-size Bristlecone pines grow in isolated groves just below the tree line, between 5,600 and 11,200 ft elevation. They are gnarled, weather-beaten, and resilient. The trees grow in soils that are alkaline, high in calcium and low in phosphorus. Those factors tend to exclude other plant species, allowing bristlecones to thrive. Because of cold temperatures, dry soils, high winds, and short growing seasons, the trees grow and reproduce very slowly. The tree's needles can remain on the tree for forty years, which gives the tree's terminal branches the unique appearance of a bottle brush (see photo). An important factor in the tree's longevity is that the bristlecone pine is extremely drought tolerant.

The wood is very dense and resinous, and thus resistant to invasion by insects, fungi, and other potential pests. The tree's longevity is also due to the wood's extreme durability. While other species of trees that grow nearby eventually suffer rot, bristlecone pines, even after death, can endure for many centuries. Rather than rot, its exposed wood (like stone) is eroded by freezing, wind, and rain.

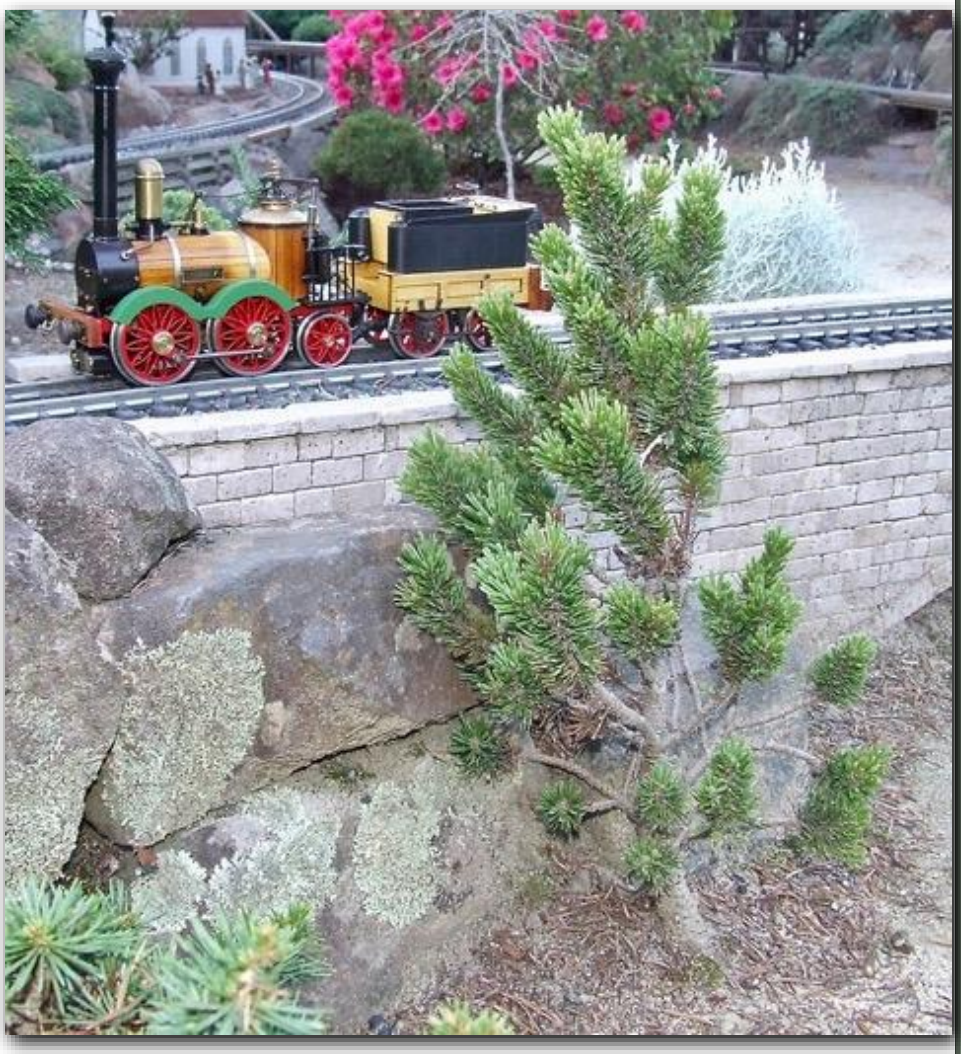
It is now generally accepted that there are two species of Bristlecone Pine, *Pinus aristata* and *Pinus longaeva*.

Pinus aristata. Now known as the Rocky Mountain Bristlecone Pine, it is native to the mountains of Colorado, New Mexico and Arizona at elevations of about 7,500 to 12,000 ft. The trees may live for thousands of years. One in central Colorado was dated as 2,435 years old.

Pinus longaeva. Great Basin Bristlecone Pine, is native to California, Nevada, and Utah at elevations of 5,600-11,000 ft. The oldest known living specimen is in California. This tree, known as "Methuselah," is some 4,851 years old. The Great Basin Bristlecone pines are not just the oldest things in California or even North America, they are the oldest living organisms on our planet.

Many of the individual trees that live in this forest are over 4,000 years old. They are about 2,000 years older than the Giant Sequoia. Interestingly, the Giant Sequoia, which are the world's largest trees, are on just the other side of the Sierras.

The nomenclature of the dwarf Sherwood Compact has proved to be confusing to me. It is often listed as being under Pinus longaeva. I have also found it listed under Pinus aristata. Even more confusing is that sometimes it is listed as Pinus aristata var. longaeva 'Sherwood Compact.' Also confusing is that there is supposed to be tiny white resin dots on just one of the two types, but I have found that the presence of resin dots is sometimes listed for both of the species. The plant in the photo above has no resin dots. Two of my other Bristlecone plants do have the resin dots. I don't know which is which. In summary, the nomenclature is as clear as mud.



In any case, the Sherwood Compact variety is a slow growing dwarf with short dark green needles that grow around the entire circumference of the branch. They remain green throughout winter. It is multi stemmed and a bit shrubby in youth until it finally becomes cone shaped. It grows about 2-3" a year, growing to 3' after 10 years. My plant in the photo is about 12 years old and is about 18" tall. It needs to be grown in full sun. It prefers dry conditions or a moderate amount of water with good drainage. It is considered drought tolerant. It is not particular as to soil type or pH. Supposedly, it's possible when grown in ideal conditions for Sherwood Compact to live 300 years. Think of it as a heritage tree for future generations.

The name bristlecone was derived from the tiny thorns on the leaves of the female cone. Sherwood Compact was found and named by the Oregon nurseryman Andy Sherwood in 1980. It is a choice example of a dwarf rendition of the earth's oldest living things. ■

THE GARDEN DEPARTMENT

Rock Garden Quarterly Archives Online

by Russ Miller

While looking through the Sept/Oct 1997 issue of the BAGRS *Trellis & Trestle* I came across this interesting and informative article by Charles Garbett. He mentions the publication *Rock Garden Quarterly*... Vol. 55 (3) ... Well, lo and behold, it is available free online! *Rock Garden Quarterly*, Volume 55, Number 3, Summer 1997

There is a lot of information in the two articles. I'll leave it to our horticultural experts to read and digest the information, so they can explain it to us plain folk. It looks like all of the issues from 2020 and older are available for free download....all the way back to 1938! I didn't physically count them, but that works out to 328 issues! I hope someone can skim through the issues and see if any other outstanding articles that can help the Garden Railroader exist... Just like Charles found and shared back in 1997. Rock Garden Quarterly Archive

Garden Tip, by Charles Garbett, *Trellis & Trestle* September/October 1997

Some of you may be interested in exploring beyond the Alberta spruce trees as part of the landscape in your garden railroad. Cheap and readily available though these are, much more variety is possible. There are many, many varieties of miniature trees and shrubs you should consider. The conifers are especially useful, and they come in a fabulous array of sizes, shapes, leaf forms, and colors. Two articles in the summer, 1997 issue of the Rock Garden Quarterly, which is the bulletin of the North American Rock Garden Society, should be of special interest.

One article is "Conifers in the Rock Garden" by Clark D. West. This article describes a great many of them, giving size, growth habit, color, soil and exposure requirements, drought and cold tolerance. It gives planting and maintenance suggestions. (*Rock Garden Quarterly* Vol. 55(3), p. 197). The other is in the same issue, p. 221, "Dwarf conifer: Musings from a Rock Garden," by Alexej Borkovec. This author lists his favorites, and gives his experiences in growing them. He provides tips in how to trim them to keep them in shape and to help them remain small, as many of them would naturally become quite large. He provides suggestions for propagating them from cutting—as an easy way to give yourself dozens of them at no cost but time and some care. ■

Garden Railroad Traffic Management System

Embarking on a Journey into Garden Trains: From Concept to Reality

By Henryk Krasuski

Henryk Krasuski is a member of BAGRS since September 2022, and lives in Denmark. He has a BSc in Electrical Engineering. He posts videos of his garden railroad development projects on his YouTube channel: Henryk Krasuski.

Join me on my journey into the world of garden railroads, tracing the path from concept to realization. Discover the inspirations that fueled this endeavor, including anecdotes about the origin of ideas and my study trip to California, where I visited the BAGRS open house and had memorable experiences.

Influenced by **Communication Based Train Control** (**CBTC**) and **European Railway Traffic Management System** (**ERTMS**), with **Global System for Mobile Communications – Railway** (**GSM-R**) replaced by **WiFi**, I am constructing the railroad and control system based on these principles. Throughout the process, I'm testing various solutions to enable communication between trains and the Traffic Control Center. This document provides technical descriptions of the different solution possibilities, details on their testing procedures, and the measured results obtained. I call this control system the **Garden Railroad Traffic Management System**, hereafter referred to as the **GRTMS**.

Introduction

With this project, I have decided to start fresh with G gauge. I am constructing the railroad's technology based on the same principles as ERTMS and CBTC. There is no predefined plan, and I'll have to test ideas, develop designs, and choose materials and components based on the test results. I am sharing my experiences so that others can learn from my journey.

During the course of my project, I have made several key decisions that shaped the direction of my endeavor. Some of these decisions include:

1. **WiFi Communication**: Opting for WiFi communication to control the train, using Arduino R4, ESP8266 or ESP32 microcontrollers programmed with the Arduino IDE.
2. **Motor Control Components**: Choosing the L298 as the driver and digital-to-analog converter for motor control, a component commonly used in 3D printers.
3. **Programming Approach**: Modifying a web server example for the ESP8266 to enable sending messages for motor control, demonstrating feasibility and functionality.

These decisions were pivotal in establishing the foundation for my project and achieving the desired functionality for remote control through WiFi. I will describe the technology using diagrams and source code.

Finding Inspiration

During Easter 2022, I was busy planning my summer vacation. I had the idea of attending a traditional Danish folk high school, but all the courses I was interested in were fully booked, and I could only get on a waiting list. The uncertainty of it all made me hesitant, and I didn't want to risk spending the summer in my Copenhagen apartment. That was a definite no-go, so I had to come up with an alternative plan. I talked to my friend Stefan, who lives and works in the San Francisco Bay area, about the possibility of visiting him to hang and geek out together. He was on board with the idea, so I booked a two-week vacation and purchased plane tickets.

At that time, there were no plans for garden railroads; it was supposed to be a sightseeing and chilling trip in Silicon Valley. However, a few weeks later, one evening, I was listening to Madis' new album "Sail," and the track "Seagulls Soar" played. The beginning of the song sounded like a steam locomotive starting, triggering the idea that my vacation should revolve around garden railroads. I joined the "Garden Railroad" group on Facebook and asked for advice on experiencing garden railroads in the Bay Area. Someone responded and directed me to BAGRS. I joined the group, contacted its members, explained my vacation plans, and expressed my interests. Luckily, there was an open house event planned for one weekend in the area I decided to visit. I communicated with several board members who were all very friendly and helpful. Stefan liked the idea, and that's how the theme of the journey became trains.

Visit to Sunnyvale

In August 2022, I visited Sunnyvale with a focus on trains. Our itinerary included:

1. **Roaring Camp Redwood Forest Steam Train**: We visited Roaring Camp and took a steam train ride up Bear Mountain.
2. **Roaring Camp Santa Cruz Beach Train**: On another day, we enjoyed a scenic ride on the forest train from Roaring Camp to Santa Cruz and back.
3. **Napa Valley Wine Train**: We then traveled the Wine Train route into Napa Valley, passing through vineyards and enjoying a delightful lunch.
4. **Central Coast Trains model train store in Atascadero**: While we didn't make it to Sacramento and the California State Railroad Museum, we did visit Atascadero and explored the Central Coast Trains model train store.

However, the highlight of the trip was the BAGRS open house. We visited six addresses and met friendly members who eagerly shared their experiences of building tracks and managing trains. A common thread among all the layouts we visited was the presence of at least one Shay locomotive. Each layout was controlled in its own unique way, showcasing the diversity of approaches within the model railway community.

Starter Set

Back in Denmark, after some research, I purchased a PIKO diesel freight train set to kick-start my journey and explore my options for controlling the train. I set up a circular track with a DC regulator for motor power control, with power supplied through the tracks—quite straightforward.

With only one train on the track, the manual regulator was sufficient to control it. However, at the BAGRS open house event, I learned that there are various ways to control trains, and I already had an idea of how I wanted to approach it. I aimed to avoid dependence on a single supplier and implement my own preferred method of control.

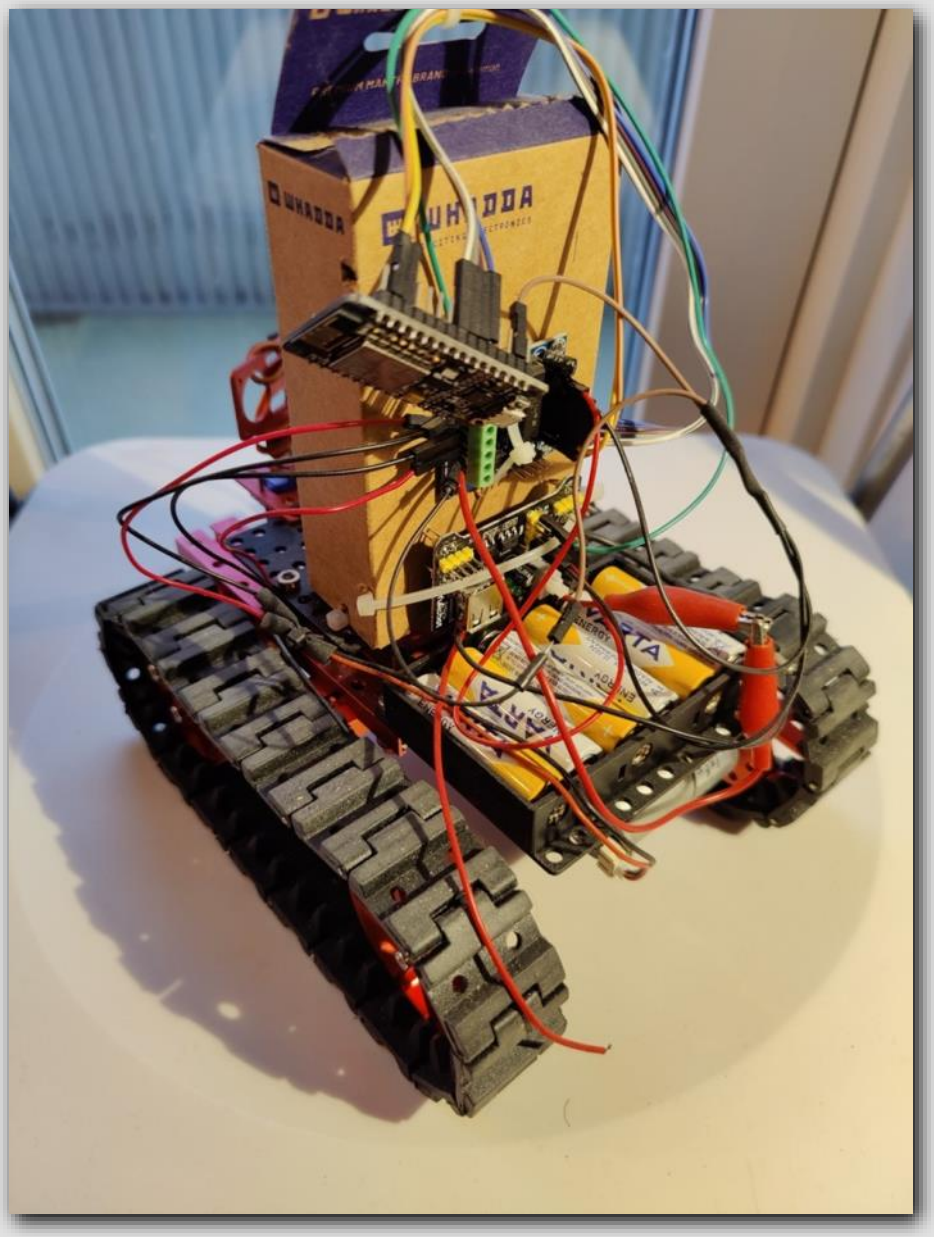
Remote Control with ESP-NOW

I had an idea to communicate with the train via WiFi, and for that, I could use the ESP8266 or ESP32 microcontrollers, both programmable with the Arduino IDE. To control the motors, I needed a driver and a digital-to-analog converter, and I decided to test the L293, commonly used for motor control in 3D printers.

I experimented with a web server example for the ESP8266 and modified it so that I could send messages to the server to control the motor. My initial test involved a tank with caterpillar tracks that I could maneuver around the room from my computer and a small remote control I had created using another ESP.

My idea passed the test.

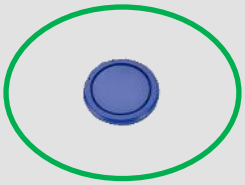
Source of inspiration: https://randomnerdtutorials.com/esp-now-esp32-arduino-ide/



1. Communication Infrastructure

2. Rail Operator Software

3. On-board Computer for Locomotive



4. RFID Tags for Track

Decisions

1. Communication Infrastructure—Communication between rolling stock, the Rail Operator, and trains occurs via WiFi.

2. Rail Operator Software—The Rail Operator is a computer program that facilitates configuration, planning, control, and monitoring of the railway and trains. Developed in Java to allow for development on a Mac and later execution on Windows or Linux.

3. On-board Computer for Locomotive—The locomotive is equipped with an on-board computer capable of WiFi communication with the Rail Operator. The on-board computer controls the motor and reports geographical location at predetermined points on the track. **Arduino R4 WiFi** is selected as the on-board computer due to its compatibility with WiFi and the **RC522 NFC RFID sensor**. The locomotive is powered by batteries, ensuring independence from DC-regulated power via the tracks.

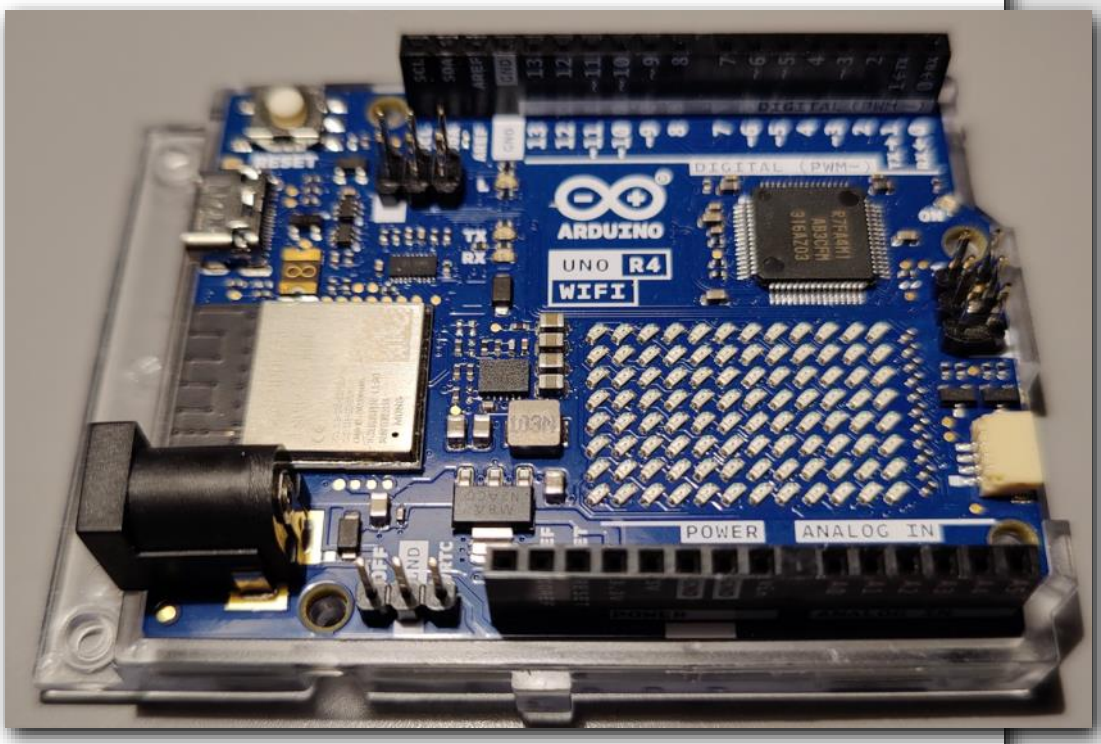
- Advantages include the ability to control multiple trains simultaneously.
- The track does not need to be divided or isolated to prevent short circuits.
- Reduced vulnerability to dirty tracks.
- Implementation of an L298 motor driver between Arduino and the motor.

4. RFID Tags for Track Sections—RFID tags are utilized to divide the track into sections, crucial for traffic planning and train control.

Key Components

Starting with the design of the locomotive's electronics is a fundamental and foundational step for the entire project. This initial stage sets the groundwork for the various components and layers that will be integrated into the model railway system. Focusing on the locomotive's electronic design, has enabled me to establish a solid base upon which to build and expand, ensuring a well-planned and cohesive implementation of the entire model railway project.

Arduino R4 WiFi



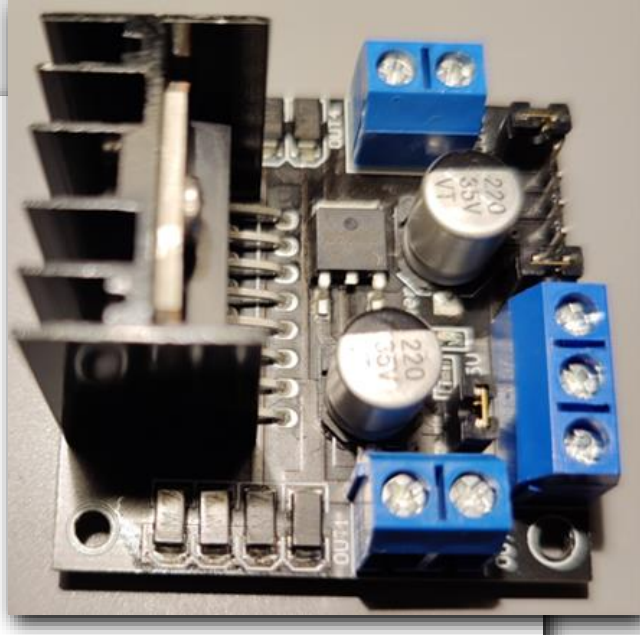
Train Computer:

- Sufficient IO (Input/ Output) capabilities to control the motor via L298, interface with a Near Field Communication (NFC) Card Reader, and accommodate potential future expansions.
- Integration of an 8x12 LED matrix to display status information when the Arduino is used without the Serial Monitor.

Online Resources:

Utilizing the wealth of examples available online for guidance and reference in seamlessly integrating the various components. This approach not only ensures a solid foundation for your locomotive's electronics but also allows for flexibility and potential enhancements in the future. Leveraging online resources will undoubtedly provide valuable insights and support, tying the technical aspects of the project together.

"Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message—and turn it into an output—activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. *What is Arduino?*, Arduino Product Website.

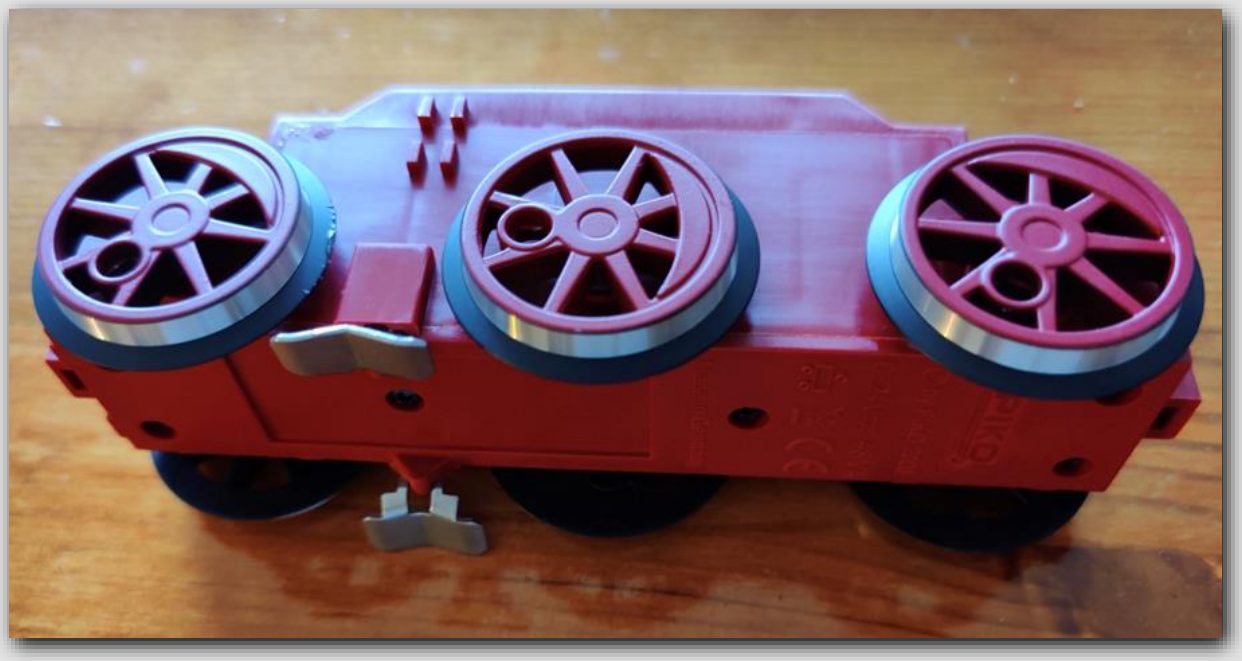


L298 Motor Driver

The L298 is a widely used motor driver that finds applications in various fields, including CNC machines and 3D printers. Known for its versatility and capability to control motors effectively, the L298 is commonly chosen for its robust performance. In the context of my model railway project, employing the L298 motor driver to control the locomotive's motor is a sound choice, given its proven track record in similar applications. Its flexibility and reliability make it well-suited for the precise motor control required in model railway setups.

Drive Unit for Piko BR80 Steam Locomotive

I have chosen to use a separate drive unit specifically for the Piko BR80 Steam Locomotive, which will benefit my approach for design, prototyping, and testing purposes. This strategy allows me to avoid disassembling my existing locomotives and provides a dedicated platform for experimenting with different components, electronics, and control systems. By having a dedicated drive unit, I can iterate on my designs, test various configurations, and make adjustments without impacting my operational locomotives. This approach enhances the flexibility and safety of my testing processes as I work toward achieving the desired functionality for my model railway project.



Test WiFi, Computer and Electronics

Pulse-Width Modulation (PWM) motor control (The “Hello World” test via direct connection) In this setup, the Arduino is connected to the motor using PWM ports for controlling motor speed and direction.

First Test:

The primary goal is to establish a connection between the Arduino and the motor and test the ability to control both the direction and motor power using PWM. PWM ports can receive values from 0 to 255, generating a square wave with a 0-100% duty cycle.

The initial program runs the motor in one direction with a value of 90 for 1 second and then reverses the direction for another second with the same value.

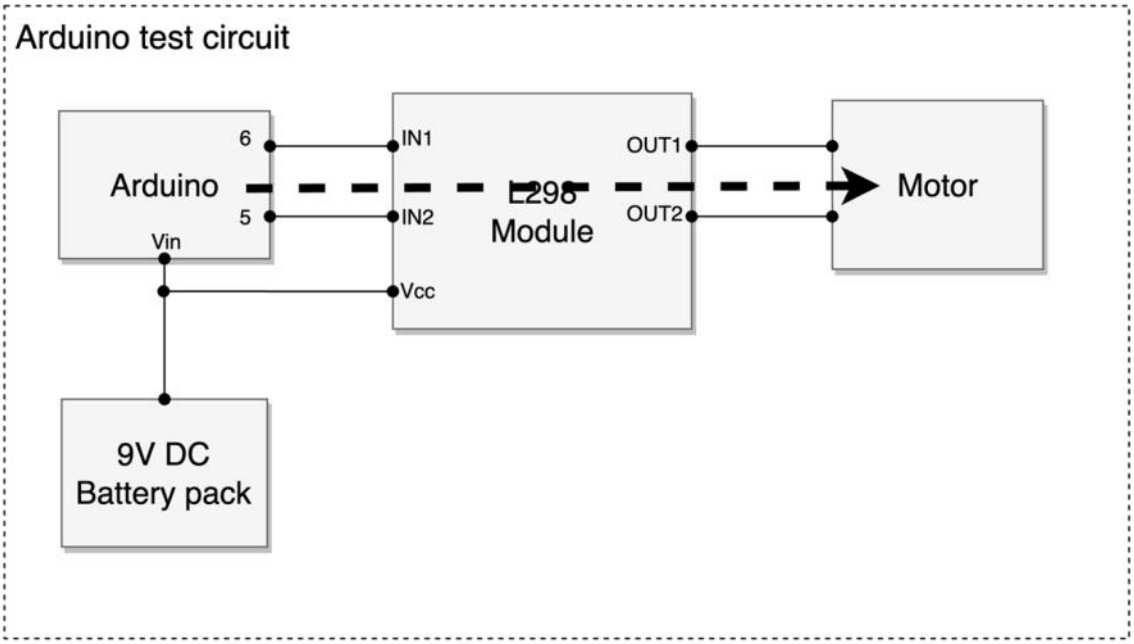
Code Link:

https://gist.github.com/hekras/60ba0fe3a1532600c720c0d60f7c1a45

Test Procedure:

- Start the Arduino and observe the motor running back and forth.

This initial test is crucial for ensuring that the basic communication and control between the Arduino and the motor are functioning correctly. Once this "Hello, World" test is successful, it is possible to build upon it for more sophisticated control and integration into the model railway project. Good luck with your testing!

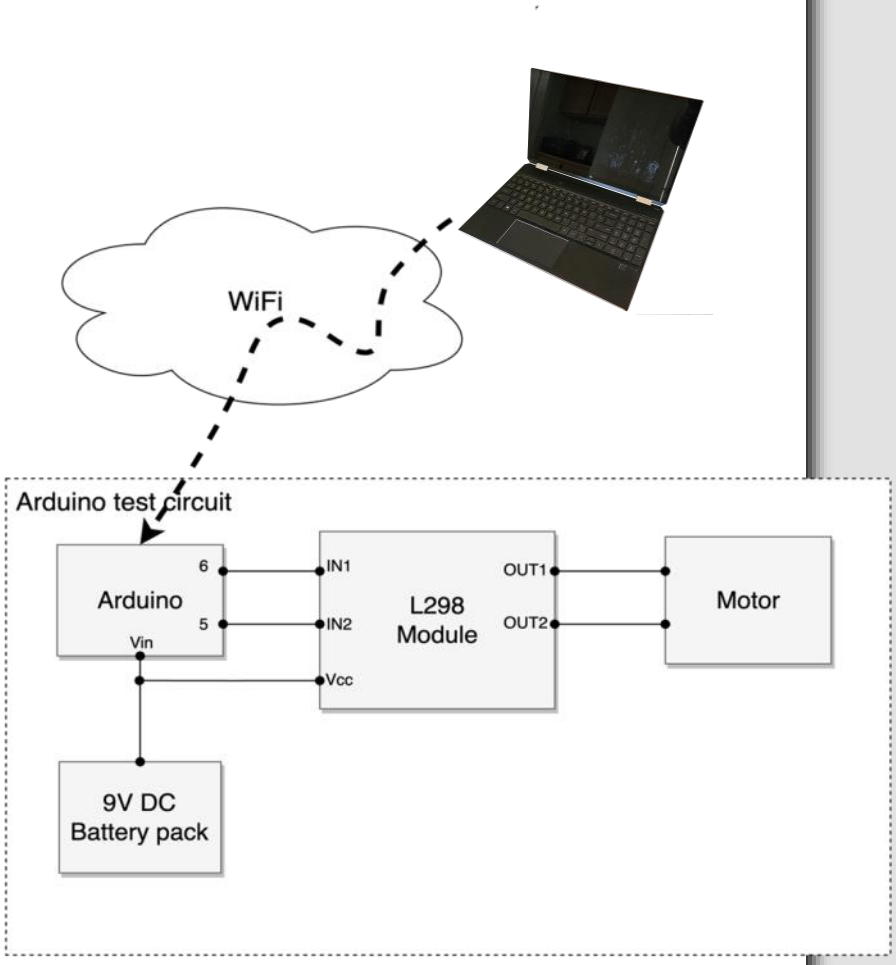


WiFi socket client dialog (The “Hello World” test via WiFi)

In this setup, the Arduino is connected to the computer via WiFi, establishing a socket connection.

Socket Communication:

- A socket serves as a channel between software components running on the same or different hardware.
- The goal is to test the socket connection with a "Hello, World" program, configuring the network connection via WiFi.



Robust Arduino Code:

- The Arduino code is designed to be robust, attempting to reconnect if the connection to the computer restarts.

Code Link:

https://gist.github.com/hekras/e55faeedafe697437299c0f89d860b80

Test Procedure:

- Start Netcat and listen on port 3000 using the command "nc -l 3000" (for Mac) or use telnet on Windows.
- Start the Arduino and open the Serial Monitor, waiting for the message "connected to server" and "21" on the LED matrix.
- Type "hello world" in Netcat and press Enter.
- Arduino should respond with "See your: hello world."
- Repeat the test a few times.

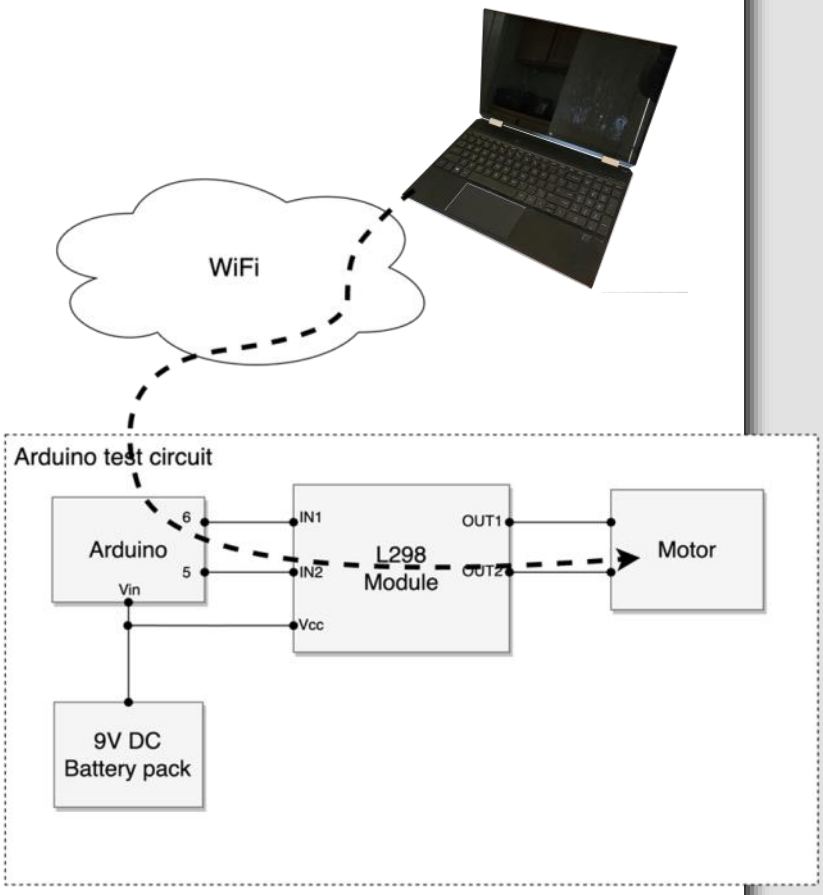
This test verifies the basic communication over WiFi between the computer and Arduino. Once successful, it will be possible to build upon this foundation for more advanced interactions and integration into the model railway project.

PWM Motor Control Through Wi-Fi

In this setup, the Arduino is connected to the computer via WiFi, establishing a socket connection for PWM motor control.

Integration of Programs:

- The two programs (PWM motor control and WiFi socket communication) are merged, allowing motor control via netcat or telnet.



Motor Control via WiFi:

- The motor waits for input regarding speed.
- Responses via netcat or telnet take the form of "H:255:0" to move in one direction or "H:0:255" to move in the other direction (max speed).
- Testing involves trying different values instead of 255 to identify potential dead zones where the motor doesn't move.

Code Link:

https://gist.github.com/hekras/a0249ffb7a13ebabb48e896b980f5eb3

Test Procedure:

- Start Netcat and listen on port 3000 using the command "nc -l 3000" (for Mac) or use telnet on Windows.
- Start the Arduino and open the Serial Monitor, waiting for the message "connected to server" and "21" on the LED matrix.
- Type "H:100:0" in netcat and press Enter.
- Observe in Netcat that Arduino responds with "F:2, F:4, F:6 ... F:100."

Video Link: **tcc coms to loco** (https://youtu.be/Fcx78h-r8-4)

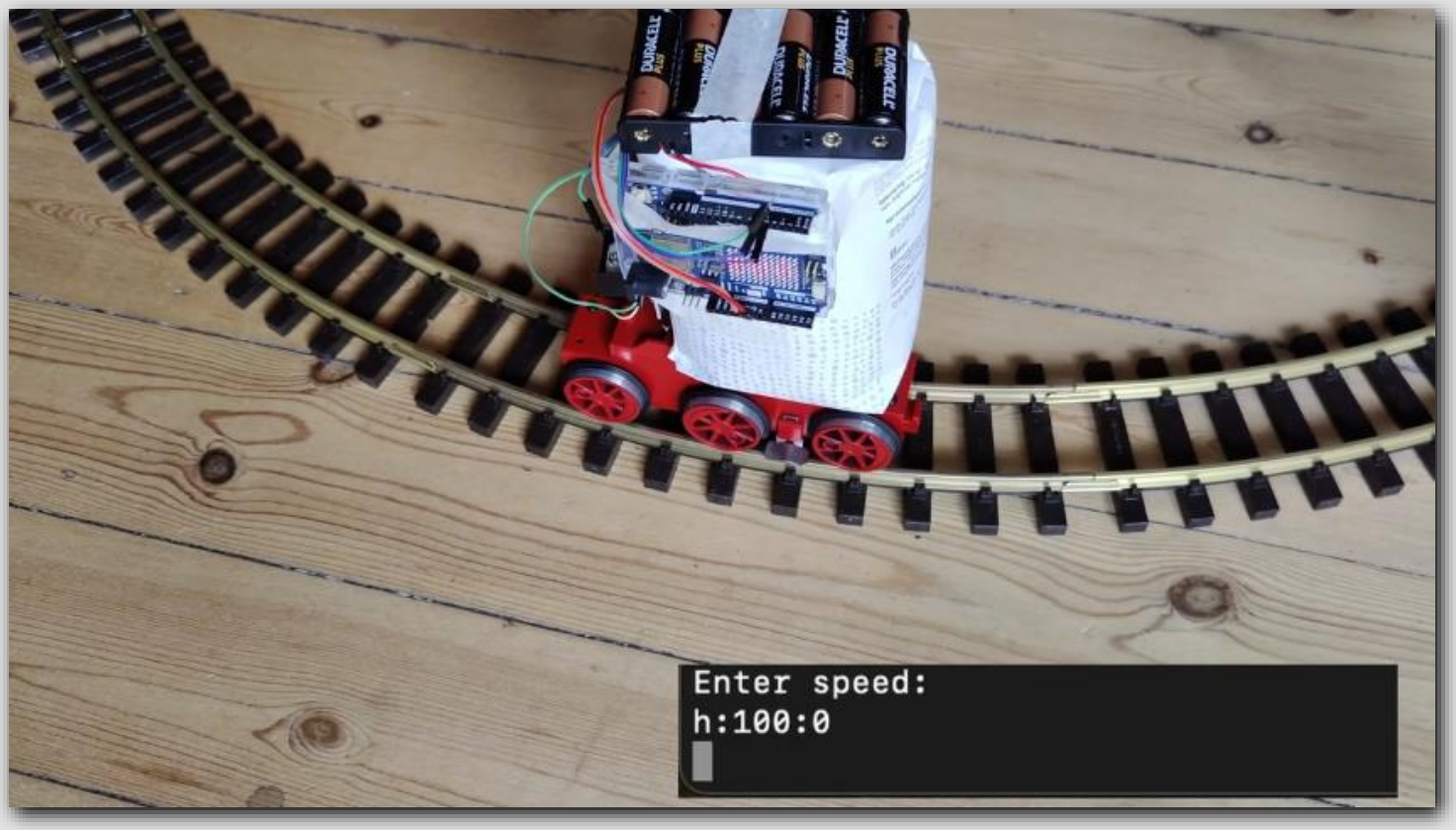
This integration test of PWM motor control via WiFi represents a significant step in the project, enabling remote control of the motor's speed and direction.

The Future of GRTMS

I'm exploring various exciting pathways for the future development of GRTMS (your model railroad control system). Here's a breakdown of potential directions:

1. **RFID Card Reader on the Locomotive**: Implementing an RFID card reader on the locomotive could open up possibilities for identification and authentication of trains.
2. **Train Management System for Multiple Trains**: Expanding GRTMS to handle multiple trains simultaneously. This could involve route planning, monitoring train positions, and coordinating activities between different trains on the layout.
3. **WiFi-Controlled Shift Track**: Integrating WiFi-controlled switch tracks could allow for remote control of turnouts and changes in direction on the layout. This could enhance automation and control capabilities.
4. **Train Schedule Programming**: Implementing a train schedule feature might include timeline-based schedules, stops, and accelerations, allowing trains to follow predefined routes and timings.

Train Management Automation for the Entire Railroad: Expanding automation to cover the entire model railroad. This could involve global planning, energy consumption management, and coordination of activities across the entire network. ■



All Steamed Up

by Rob Lenicheck

Rob Lenicheck has been involved in the live steam hobby for about 20 years, modeling in 1:20.3. He has scratchbuilt multiple engines and converted others to his passion: running coal-fired locomotives.

BAGRS Live Steam Gathering, November 25, 2023

It had been a while since the BAGRS live steam crowd got together to boil some water. A select contingent of Bay Area folks attended a steamup at the Lenicheck residence to do some major tongue wagging and have fun watching the steam plumes rise from the many engines which ran that day.

Before I start with the details, I want to thank Richard Murray. Richard has passed the BAGRS Live Steam torch to me. He has done such an exemplary job of reporting and scheduling all things live steam for many, many years. Thank you, Richard, for your many years of service to the club. Yours will be hard shoes to fill.

The crew who came to share their wares, fix others problems and boil some water were, from left to right:

George Crabb, Melinda Murray, Dennis Mead, Phillip Boles (kneeling), Bill Mansell, Chris Gathard, Ron Sickler (seated), Tim Boles, Bob Trabucco, Clint Baker (kneeling), Sean Mahan, Richard Murray, Colton Snell (kneeling)

The backyard scene was a busy place, the tables packed with live steam engines awaiting their turn.

One of the few folks there without gray hair was Colton Snell. Here he is showing off his two steamers he brought. The green one, a model of the famous Guinness tram engine, is one which he obtained from Regner in Germany as a kit. He put it together in just a few days. It was apparently not much of a problem form him, even with the instructions being in German.

The Guinness running:

In contrast to the diminutive size of the Guiness is the Accucraft 7/8” scale SR&RL, coal-fired locomotive owned by Philip Boles. Philip seems to have mastered the fine art of coal firing.

Chris Gathard is another relative newbie to the live steam hobby and has done a fine job of altering the looks of the traditional Accucraft Ruby, including a tender and wood cab.

Clint Baker is a live steamer who has never been involved with BAGRS but owns and runs several live steam engines on his own layout at home. He seemed to very much enjoy his first BAGRS gathering. For those who might not know Clint, he is a very busy professional musician who plays several brass instruments and is very well known in the traditional jazz scene. He also has a 30-minute radio broadcast at 6 a.m. on KCSM jazz 91.1. And, no, it's not a live broadcast—he says he likes his sleep too much. We'll be seeing more of him in the future.

And where would the live steam world be without a Cricket? These machines were produced by the hundreds over the years and they are all great runners. This one is owned by Ron Sickler.

Jim Goss is shown firing up his Accucraft C-16. These engines were the first American profile, narrow gauge (1:20.3 scale) locomotives produced by the company starting about 15 yrs ago. Many, like Jim's, are still running today despite being heavily used.

Bill Mansell drove over from Santa Cruz to run his beautiful, scratchbuilt locomotive and rake of cars. Bill's engines are really a marvel to behold, as they run wonderfully with a fit and finish to match. Bill is a former tool and die maker so we all guess he knows what he's doing.

Melinda Murray made an exception to her own rule of not running her engines at steamups. She normally spends most of her time making sure everyone else is well fed and watered. (And for this we are most grateful!) Here she is shown coaxing her Accucraft 0-6-0 switcher out onto the main line for a run.

Bob Trabucco is digesting his pizza while watching the festivities. Bob brought his Accucraft 4-4-0 and two coaches to run.

Another newbie who has gotten the live steam bug, Sean Mahan, brought his newly acquired Accucraft American. This was one of the first times he ran the engine after buying it on the used market. The amazing thing about the live steam crowd is that our folks not only welcome “fresh meat” into the fold but help anyone and everyone solve their problems. (Well, maybe not all their problems.) Sean’s engine had a problem with the butane delivery tubing and we helped him solve it on the spot so he could have a successful run.

Finally, I was allowed to run my “beast” around the track a few times after things had settled down a bit. Had a successful run and most of the kinks on this build have finally been ironed out. Hope some of you “sparkie” folks can jump in with the live steam crowd in the future. Come on in! The water’s fine! ■

Dave's Corner

by Dave Frediani

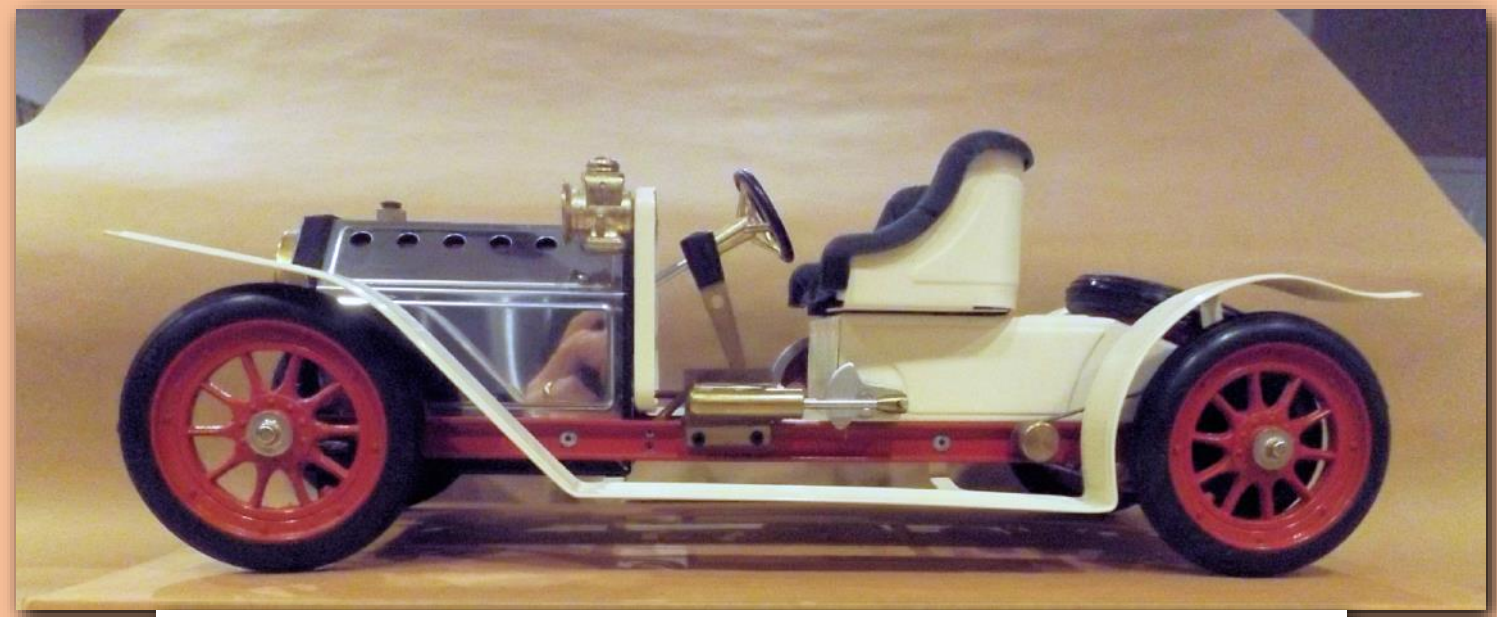
Dave Frediani lives in Sonora, California and, among his many talents, constructs 7/8 scale rolling stock.

7/8 SCALE MAMOD RAIL TRUCK

About eight years ago, a fellow live steamer wanted me to build him a 7/8 scale boxcar, to tow behind his Mamod limousine car that he converted to a 7/8 scale rail car. He emailed me several photos of his limousine and I never thought too much about it. But, as I was building his boxcar, from time to time, I would find myself looking over the photos of his limousine running on his railroad, and would always catch myself thinking what an odd looking rail car and what ever possessed him to convert the limousine to a rail car.

After finishing his boxcar, we emailed back and forth, making sure he was happy with the finished car.

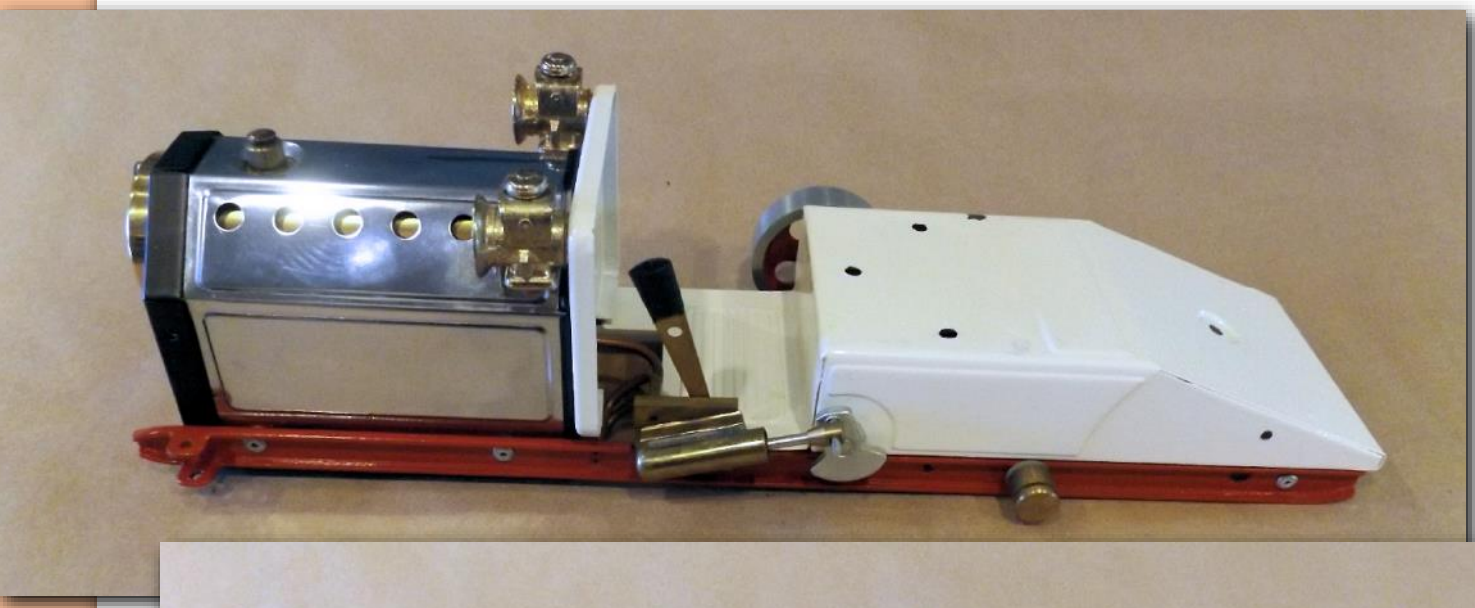
I never thought much about the conversion for sometime and than it happened. I saw a used Mamod Roadster on E-Bay and before I knew it, I was the proud owner of a Mamod Roadster.

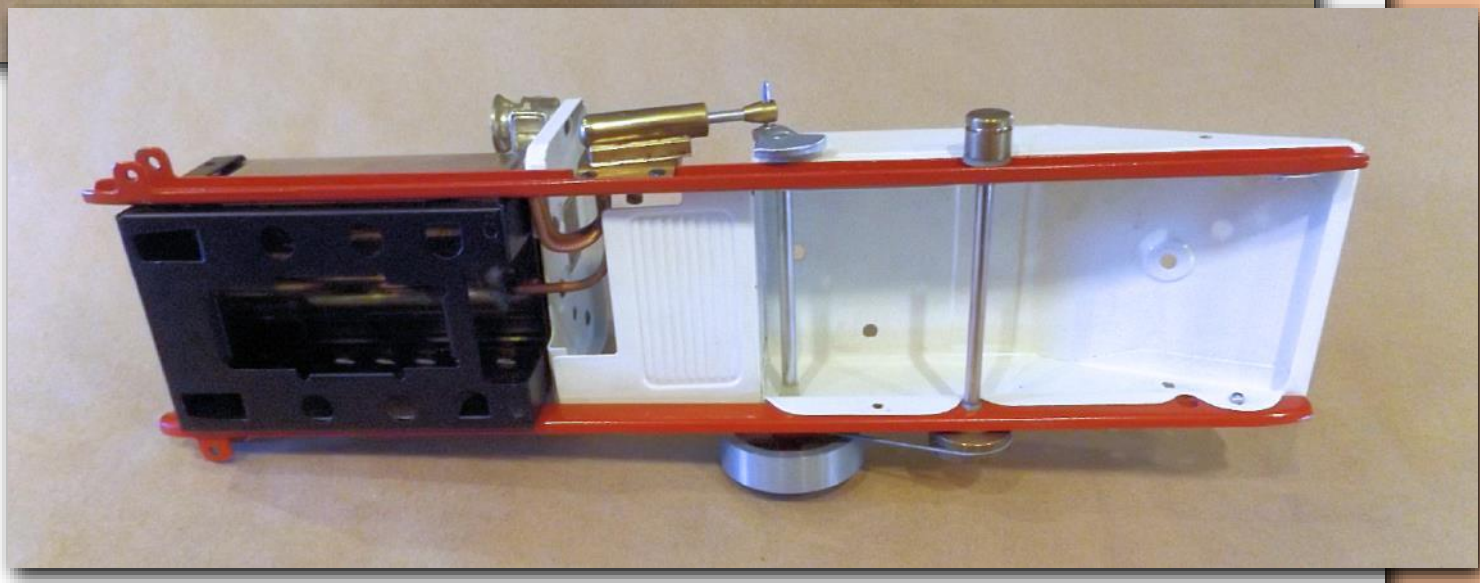


This is how my Mamod Roadster looked when it arrived at my front door.

The Mamod Roadster uses solid fuel tablets, which is just another form of Sterno. I ran the roadster around on my garage floor and needless to say it didn't run that well or that long. After running the roadster a few more times, I kept thinking about whether I wanted to go through with converting this thing to run on tracks. I had my doubts and was thinking, What a waste of time this project may turn out to be. But you know what they say, "curiosity killed the cat."

Here are two views of Roadster disassembled:





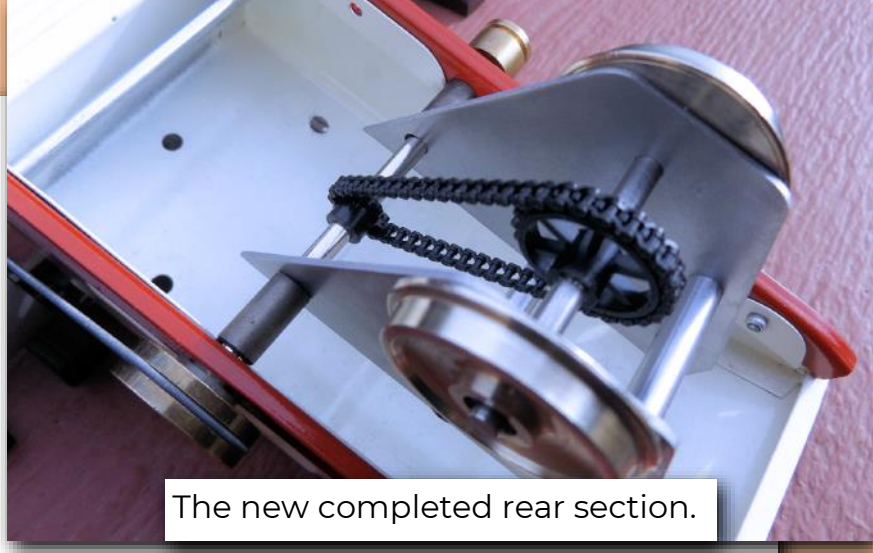
So before I knew it, I was ready to build a rail truck, but still not knowing how. The easy part of this project was removing all the parts that weren't going to be used, like wheels, axles, fenders and seats.

I started the assembly of my new rail truck by making, two rear axle brackets out of a 16-gauge metal plate to support the new rear axle along with its 32-tooth drive sprocket and spacers.

Next I removed everything from the counter shaft and replaced the counter shaft with a 10-tooth sprocket with spacers to keep the two sprockets in alignment.

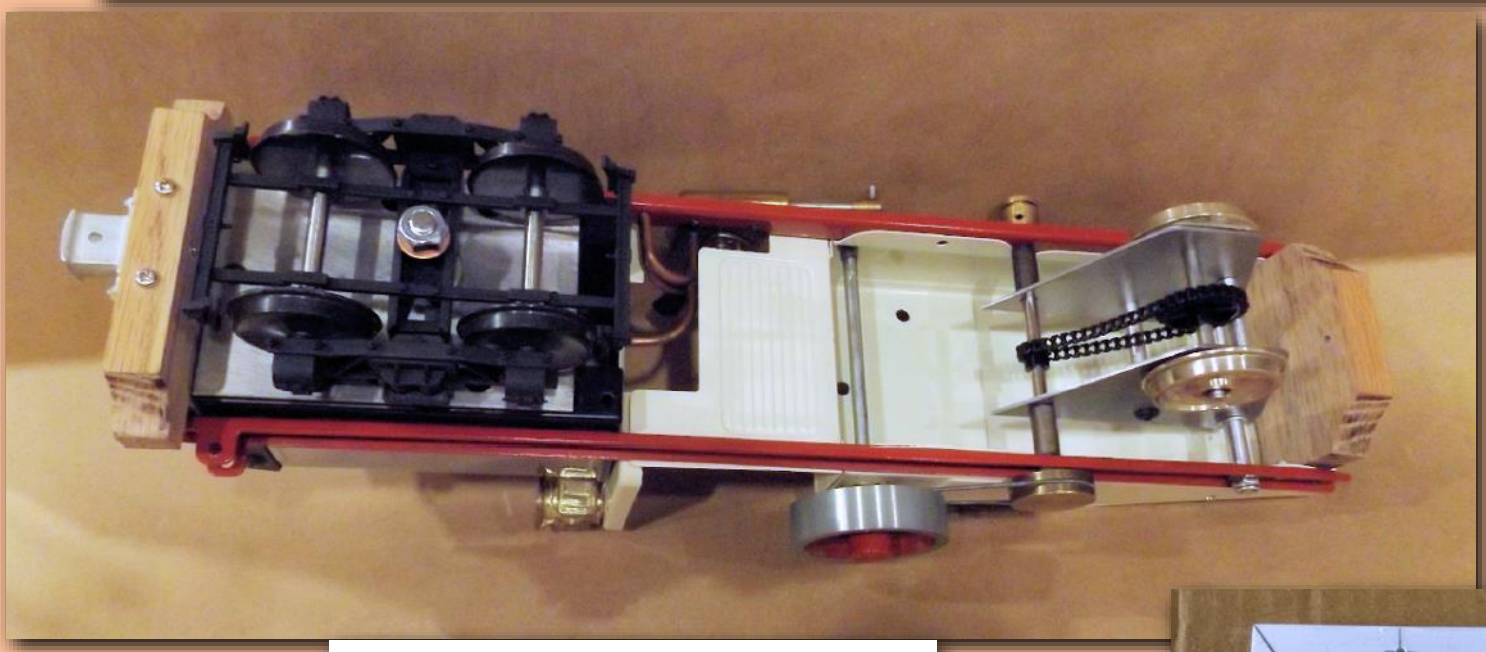
After the two sprockets were aligned, they were connected with a chain. The ladder chain and sprockets all had a 0.1227 pitch and came from Servo City.

Now it's time to install the new front trucks. For the front trucks I used a Accucraft two axle truck assembly complete with wheels.

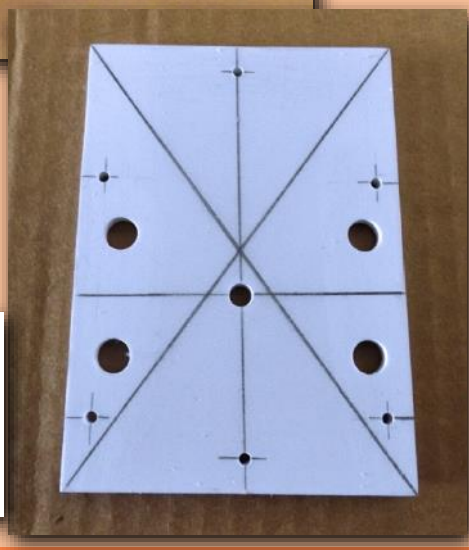


The new completed rear section.

Mounting the front truck assembly was easy enough. I just used more of the 16-gauge metal left over from the rear axle supports. The only thing I needed to keep in mind is that you must leave enough space between the frame and the plate that your mounting the truck assembly to, so that the burner will be able to breathe. I used three, 3/16" washers for the needed spacing on each hole drilled. I used six 3/16"holes to screw the mounting plate to the frame. I also drilled four other 3/8"holes just for more air to pass through to the burner. One 1/4" hole to mount the truck assembly to the mounting plate.



View of new front truck assembly along with the rear axle assembly.



The styrene template I used for a pattern for mounting the front trucks to the frame. The real piece is made from a 16-gauge metal plate.

All the body work was built from 1/16” and 1/8” styrene and Evergreen styrene strips. For all the end beams, I used oak wood and 7/8 scale link & pin couplers from Ozark Miniatures.

After running my rail truck on my tracks, I soon realized that it didn’t seem to have enough power and I felt that I had wasted a lot of time that I’d never get back.

So, I called the live steamer that started all this silly nonsense and he told me all I needed to do was to walk around with the rail car and squirt a little oil in the cylinder piston every now and than to increase the speed and run time. Then he said, I know that sounds crazy but it works, and then we laughed about it. So at that point I decided I would try to build my own oiler. How hard could it be?

As it turned out it ended up being very easy to do. I used a piece of 3/8” copper pipe about 1-5/8” long, two 3/8” copper end caps. I soldered one 3/8” cap to the 3/8” pipe, which became the bottom cap.

Next I drilled a 1/8”hole in the soon to be top cap, and taped it out to 4 mm, so that a short 4 mm bolt can become the oil filler cap.

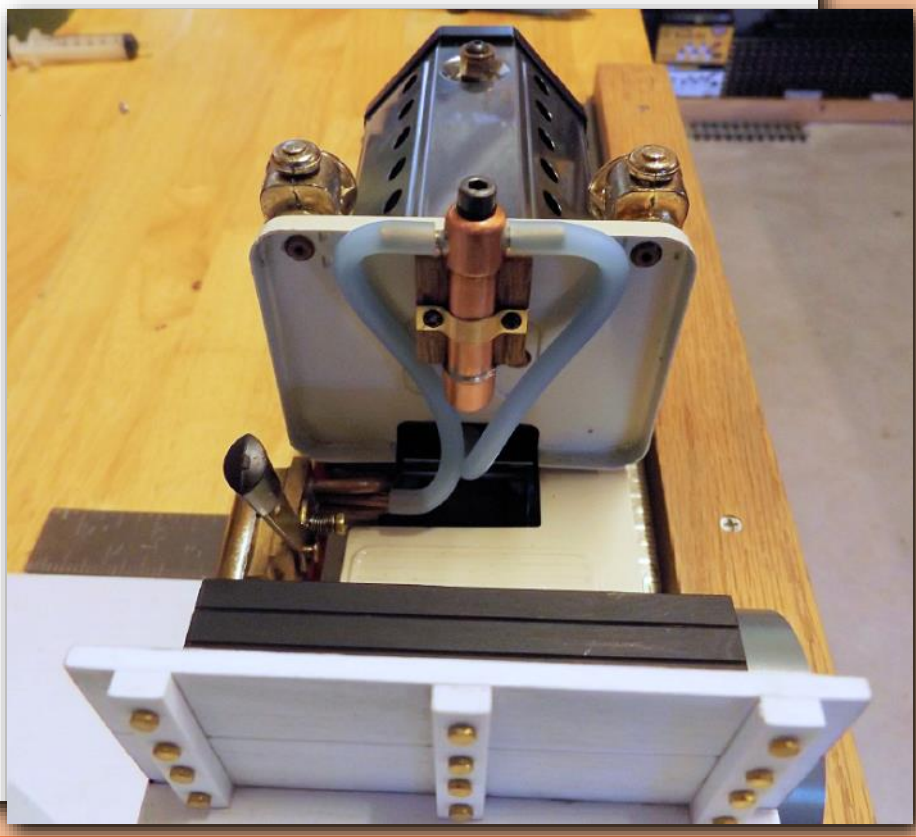
After removing the 4 mm bolt, I soldered the top cap in place. Using a piece of 1/8” brass tubing about 1-1/4” long, I drilled a #60 hole in the top of the tubing only, making sure the hole was in the middle of the tubing.

Next I drilled a 1/8” hole through both sides of the top cap, then sliding the 1/8” piece of tubing through the two holes in the side of the top cap, making sure that the #60 hole was facing up and centered in the 3/8” tubing. Then I soldered the tubing in place.

With the oiler held in place on the dashboard of the rail truck with a small brass band, I cut out a 1” piece of the original tubing that ran under the body from the boiler to the piston cylinder.

Next I ran heat resistant plastic tubing from the boiler to one side of the new oiler and on the other side of the oiler, I ran another piece of plastic tubing to the cylinder.

Little did I know that Mamod now offers an oiler just like the one I made as an accessory—who knew?

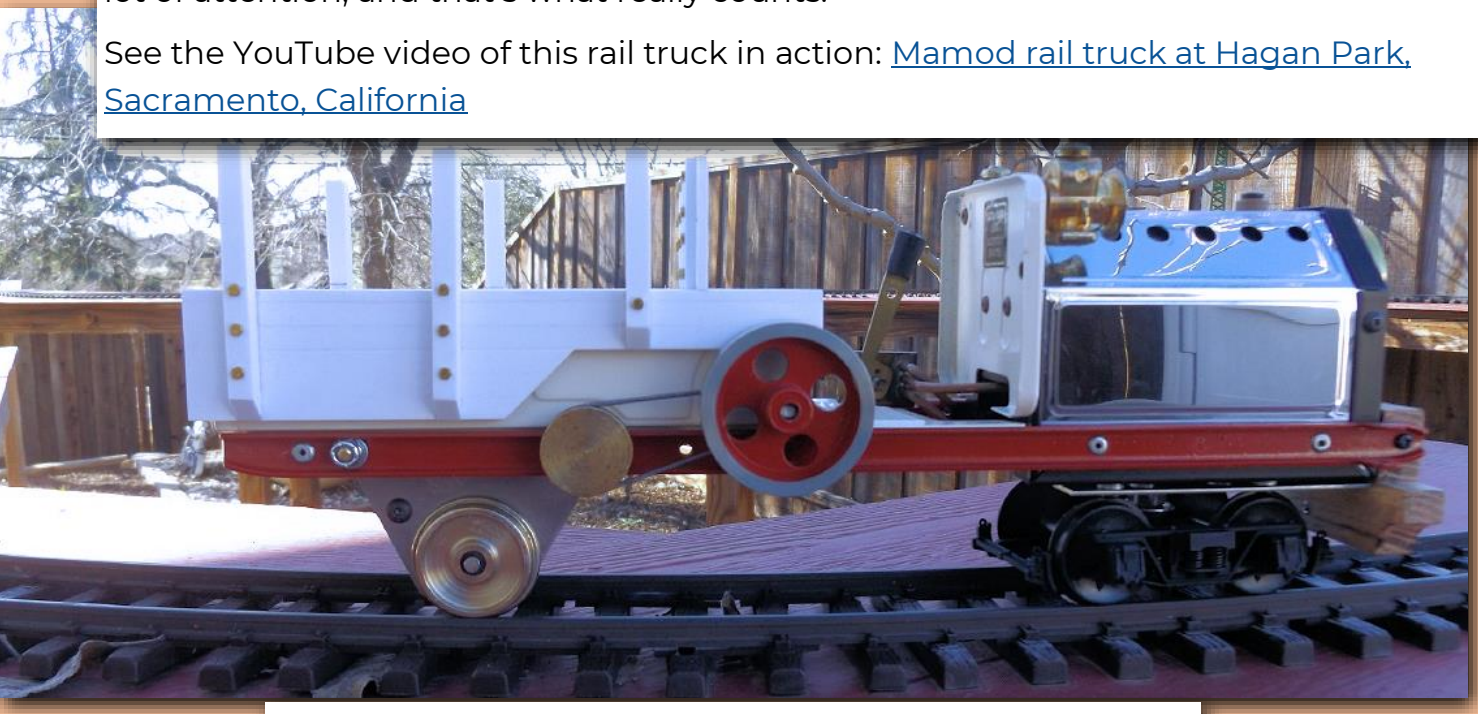


After all this work I couldn't just stop, so I decided to install a ceramic burner kit, which was made by Mamod and sold by Mini Steam of Ohio. The total cost of the kit was about $149.00 with shipping included. The burner kit went together with no problems at all.

The only problem that came up was that I found it really hard to light the burner because you can't see it, but after a few tries it became easier.

I now have a pretty cool rail truck that runs for about fifteen minutes with a top speed of slow, and as it runs down the track is sounds like it has a rod knock. But it seems to get a lot of attention, and that's what really counts. ■

See the YouTube video of this rail truck in action: Mamod rail truck at Hagan Park, Sacramento, California



View of the Rail Truck almost finished on a test run.

The finished Rail Truck. The driver seems unaware of the bear trying to get into the boxes filled with honey.

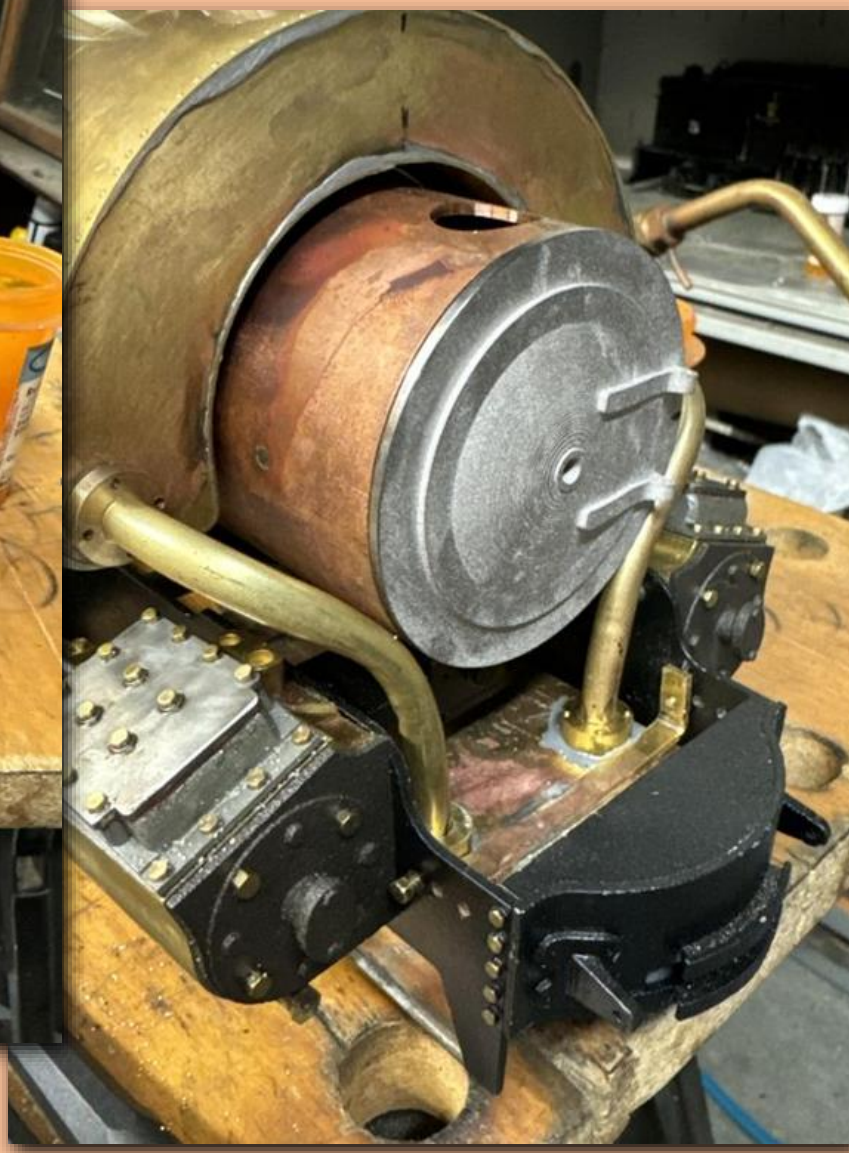
East Devil Hills Modeling Group

by Henner Meinhold

Henner Meinhold resides in Berlin, Germany. The *East Devil Hills Modeling Group* meets regularly to create, collaborate, and share incredibly machined models.

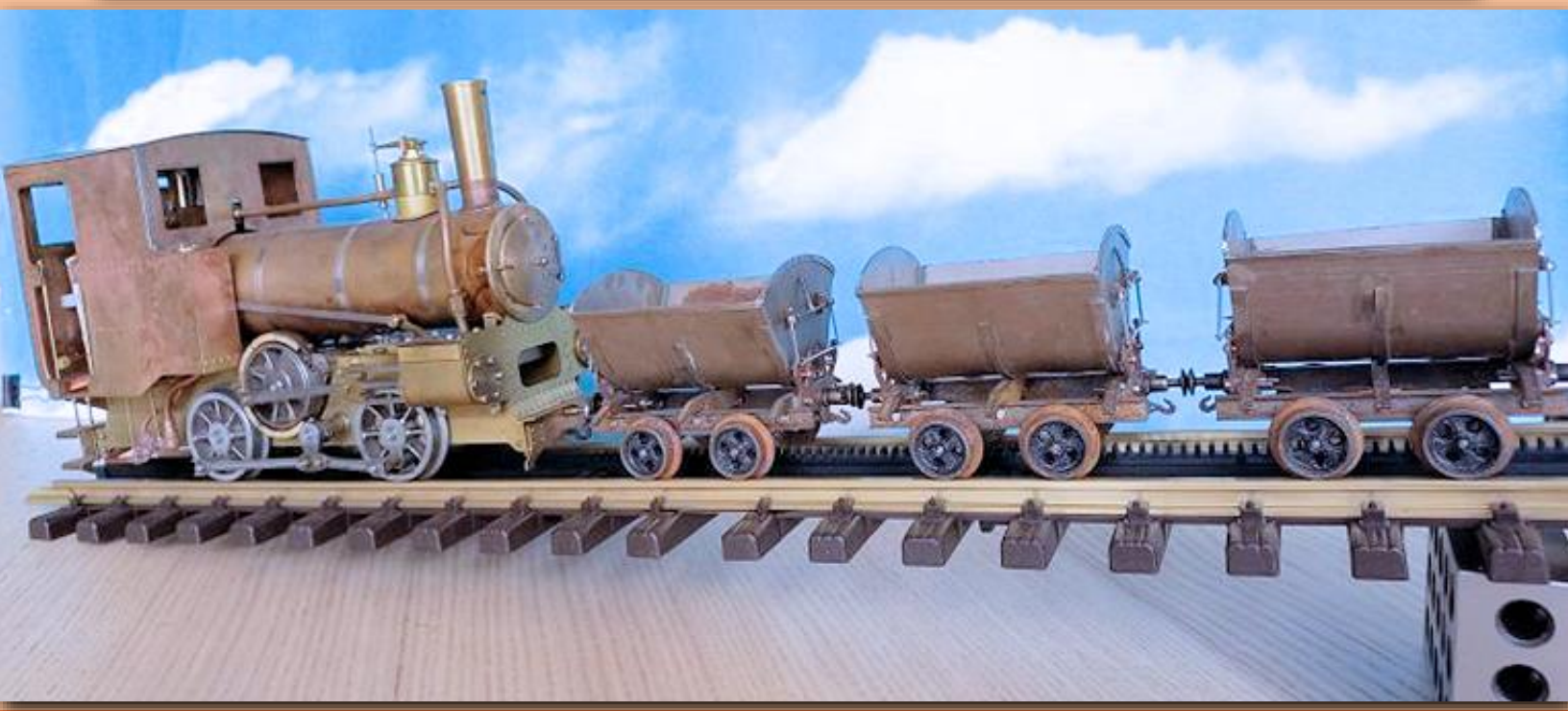
Sorry, another very short report...

Rob Lenicheck works full speed on his Darjeeling loco. As the saddle tank is fully functional, he needed some intricate plumbing to connect it to the tank between the frames. It was very difficult to bend the pipes to the correct shape.



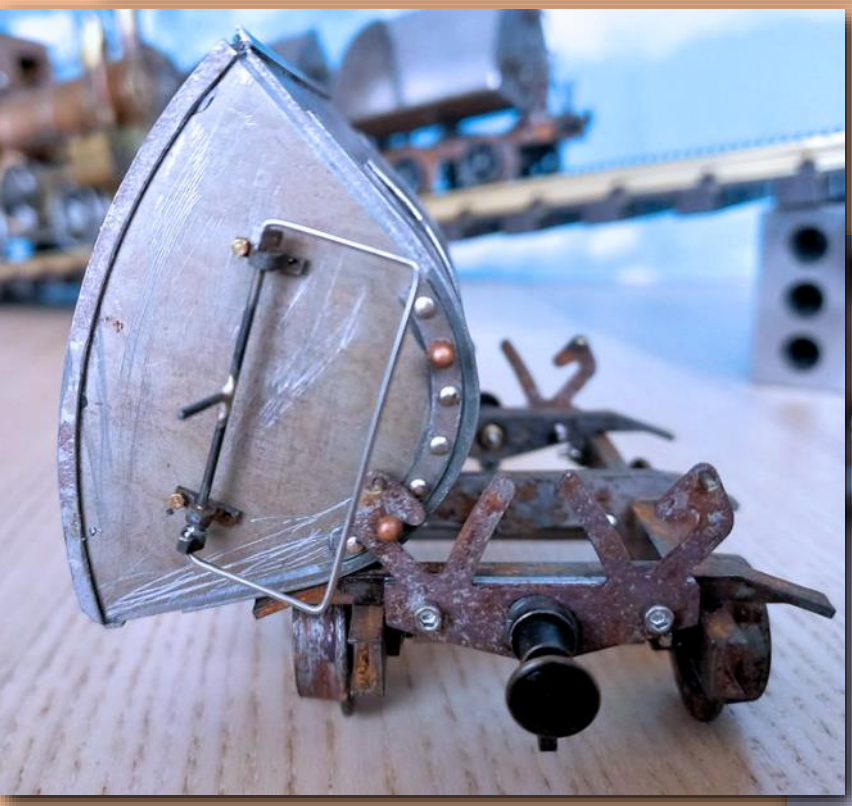
With the smokestack added it starts looking like a real loco:

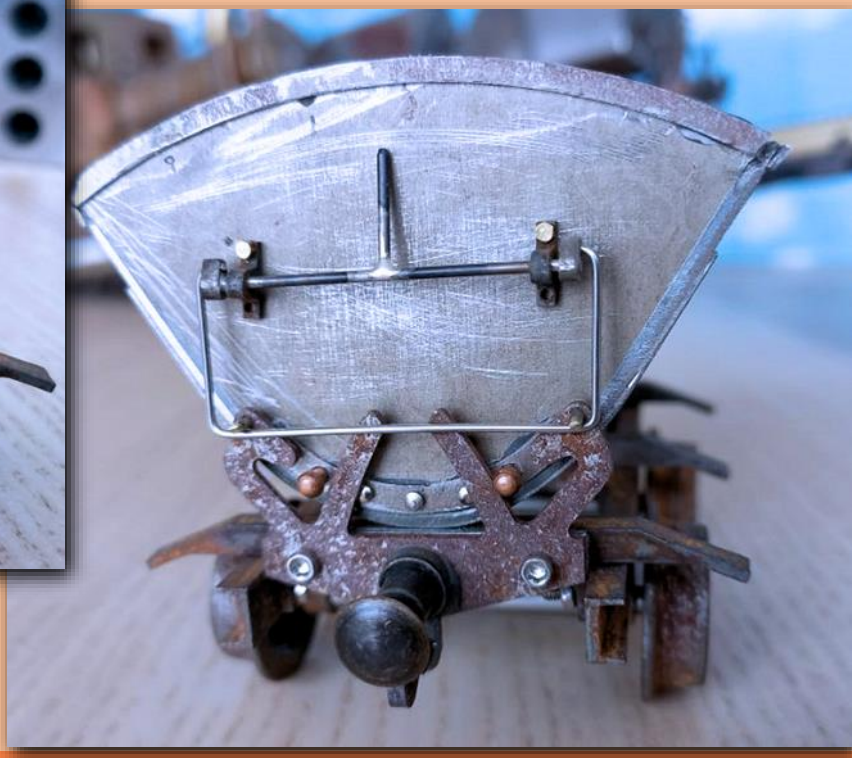
Just in time for Christmas, I received a parcel from Dennis. It contained 3 tippers built by him for my cog loco. Right away I had to set up some track and make photos of the train:



As the tippers are fully functional, another photo with them in the open position:

Here are some photos of the latch mechanism open and closed:





Dennis built the tippers using plans from a booklet published around 1880. The rust is real as the parts are made of steel. By the way, the loco I built is from drawings in the same publication. At least the loco was built in Switzerland as the first narrow gauge cog loco ever. I will eventually get some genuine ore from the site, where the train operated.

Off-topic, but somehow amusing: About 50 years ago my grandpa gave me a Unimat lathe for Christmas. I used it for many years and when I moved to the US, I left it behind with a friend, as I intended to buy Sherline equipment. The lathe lay dormant for many years until a couple of weeks ago. My friend had resurrected it and was happily making parts:

I hope, you started the New Year with lots of new ideas around your trains.

Henner ■

Postcards from the Past

By Bill Ralph

Bill Ralph operates the *Porcupine Gulch Railroad*, and knows a thing or two about amusement parks and postcards.

Victoria Station

The concept of a British Railway themed restaurant chain began in 1963 as a hotel administration graduate project by Bob Freeman, Peter Lee and Dick Bradley. The trio's first restaurant opened in San Francisco six years later with dining in iconic boxcars and cabooses. A central lobby featured English railway station decor, historic railroad artifacts, and a signature London-style phone booth. In less than ten years, the highly successful enterprise had ninety seven Victoria Station restaurants spread across the country. The popular chains menu offered prime rib, steaks, BBQ ribs, and "Shrimp Victoria" while Johnny Cash contributed to the railroad ambiance by providing a collection of train songs. The Victoria Station chain flourished in the 1970s culminating in a joint venture with Hollywood's Universal City establishing a restaurant at the "top of the hill" that included a funicular railway that carried hungry patrons six hundred feet up to the one of the most popular and highest grossing restaurants in the United States. Victoria Station ran into financial problems in the mid-1980s creating a gradual closure of franchise restaurants and ultimately the filing for bankruptcy protection. The last remaining restaurant, located in Salem, MA closed in 2017. ■

Circa 1970s Victoria Station Postcard from the collection of Bill Ralph

MEMBER UPDATES

From Ray Turner:

MMRR 2024 Remodel

My **Mystic Mountain Railroad** is 25 years old this year. That's about 75 in people years because it is in the sun 12 months a year. It is showing its age in many ways. And so am I. Last summer I decided I would downsize the railroad to reduce maintenance to a manageable level. I inspected the railroad in detail and made a list of all the track needing repair or replacement and all the other elements of the RR needing repair work. There was a lot. But I was surprised to learn that a lot of the maintenance required every year was plant-related. Groundcover needs monthly pruning. Drippers get sun-brittle and break. Trees drop leaves and needles in the winter and need pruning to control growth in the spring and summer.

My Seiju Elms were a maintenance problem in themselves; they drop sticky sap on the tracks; they drop little leaves that, when wet, stick in the track. They grow to about four feet high every year and the pruning got to be onerous. The trunks had grown to about 8-10" in diameter over their 20 years in that spot. The trees made a nice view block, but I determined they had to go to reduce maintenance. The photo shows the before and after. I haven't decided what to put on the hill in place of the trees yet. Whatever it is, it will have to be maintenance-free.

Five Seiju Elms after 10 years

Pruned down to 18" every winter

Forest Clear-Cut to Save the Railroad

There are several areas of track that I identified as in bad repair. The small (prototypically-accurate) spike heads deteriorate in the sun over the years and break off easily. Some were so fragile they just broke off from picking up the track to repair it. The North End yard was one such area—old and made brittle in the sun. The outside track was built over a makeshift shelf extension. I decided that I would replace the track and replace the makeshift shelf with a cement board shelf custom fit to the space. As long as I was replacing it, I made it one track wider to increase the yard storage space. This will improve operations allowing longer trains to be initiated from North End yard.

Before – track to be replaced is removed.

Enlarged cement board platform from installed.

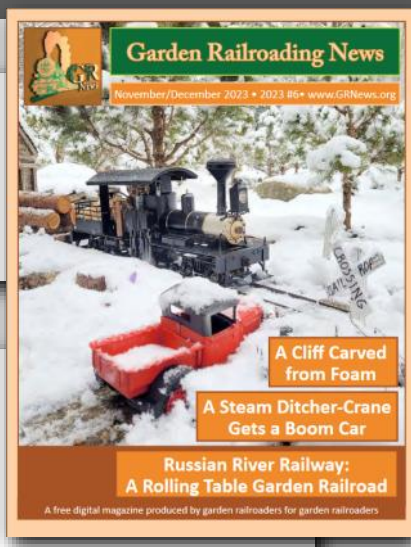
New tracks installed; extra yard storage added.

Yard Throat with Ballast Added.

Earlier this year I got tired of adjusting tunnel clearance and just daylighted that tunnel. Those are the kinds of things I can do to keep the trains running while reducing maintenance to a level I can manage. I will continue working my way through my repair/replace list as far as I can. Maybe I won't have to abandon a section after all. ■

MEMBER UPDATES

The story of the development of **Robert Pitonzo's** table top *Russian River Railway* is a featured article in the November/December 2023 edition of *GR News*. "Russian River Railway on a Rolling Table Base," by Robert Pitonzo.



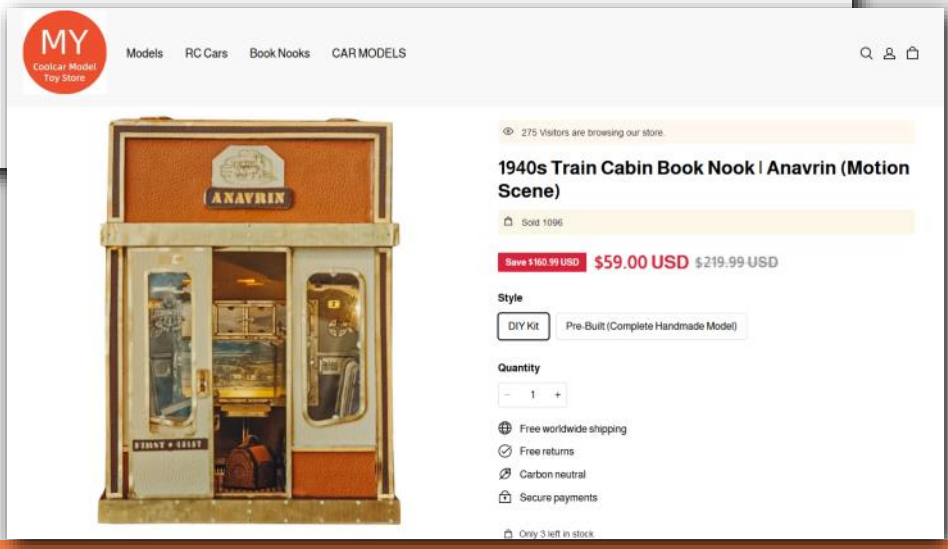
From Russ Miller:

Noticed that the Mendocino Coast Botanical Gardens (located just south of Ft. Bragg) has quite the collection of miniature plants for sale.

From Steve Smith:

These "Train Cabin Book Nooks" are on sale here:

1940s Train Cabin Book Nook | Anavrin (Motion Scene) (modeltoystores.com)



GARDEN RAILWAY CLUB NEWS

BAGRS has a policy of reciprocal sharing of newsletters with the following garden railway clubs. We do not share private member information such as home addresses or tour information without the express permission of the particular member. We provide links here to the most recent editions that have been made available to us. For other clubs wishing to obtain a copy of the latest BAGRS *Trellis & Trestle*, please contact **Roger Nicholson** at communications@bagrs.org

Central California Coast Garden Railway Society—2023 Special Edition

Central Ontario Garden Railway Association

Denver Garden Railway Society Newsletter—November 2023

Gold Coast Garden Railway Society—October 2023

Orange County Garden Railway Society—September 2022

Puget Sound Garden Railway Society-October 2023

Redwood Empire Garden Railway Society—October 2023

Rose City Garden Railway Society—October 2023

Sacramento Valley Garden Railway Society—December 2023

San Diego Garden Railway Society—April 2023

Santa Clarita Valley Garden Railroad Club—October 2021

The Garden Whistle New Zealand Large Scale Newsletter—October 2023

Garden Railroading News—November/December 2023

The 2025 NGRC 2025 will be hosted by the Sacramento Valley Garden Railway Society.

Website coming soon at ngrc2025.org

BAGRS BOARD AND CONTACT INFORMATION

ROLE	NAME	EMAIL ADDRESS
President	Mick Spilsbury	president@bagrs.org
Secretary	Lynn Gerber	secretary@bagrs.org
Treasurer	Larry Silverman	treasurer@bagrs.org
Membership	Ray Turner	membership@bagrs.org
Scheduling	Greg Hile	greghile@outlook.com
Live Steam	Rob Lenicheck	rlenicheck@yahoo.com
Communications	Roger Nicholson	communications@bagrs.org

BAGRS DISTRICT SUPERINTENDENTS

DISTRICT	SUPERINTENDENT
Golden Gate	Ken Brody
East Bay	Bill Ralph
North Peninsula & San Francisco	Don Watters
Mid-Peninsula	Don Watters
Tri-Valley	Jim Rowson
Diablo Valley	Frank Lucas
Sunnyvale & Santa Clara	Mike Paterson
San Jose & Milpitas	Michael Laine
Santa Cruz & Monterey Counties	Trevor Park
South Santa Clara & San Benito Counties	Open
Members Outside BAGRS Districts	Nancy Norris

MEMBER BULLETIN BOARD

Including recent entries from "Items for Sale by Members"

- **From George Nagata:** Bachmann 2 truck or 3 truck Shay for parts only. Email me at **gnagut@comcast.net**
- **From Roger Nicholson:** FREE items. I have four **Trainpower 6200 controllers** that I acquired as part of various collections. Some are very rusty on the outside, but I've tested them and they all three appear to work. I also have four Powersonic 6V batteries used with Sierra sound cards. These are the **PS-605 gel cells that came with Sierra sound cards**. They have been sitting for years, but all four appear to be brand new (one is in an unopened Sierra package). I have no idea if they work, and I don't use these types of batteries, so they are free to anyone who might want them. Please email me at **rogermamie@yahoo.com**.

MEMBERSHIP INFORMATION

NEED A BAGRS NAME BADGE?

Send a $15 check, payable to BAGRS, for each badge ordered. Be sure to print the name (s) and City(s) for the badge(s) clearly. Send to: BAGRS Member Badges, 210 Friar Way, Campbell, CA 95008

BAGRS FOR SALE BY MEMBERS

List items you have for sale or items you want. You'll find it in the middle of the "Members Section" menu on our website, bagrs.org. Log in is required.

BAGRS ONLINE PHOTO AND VIDEO LIBRARY

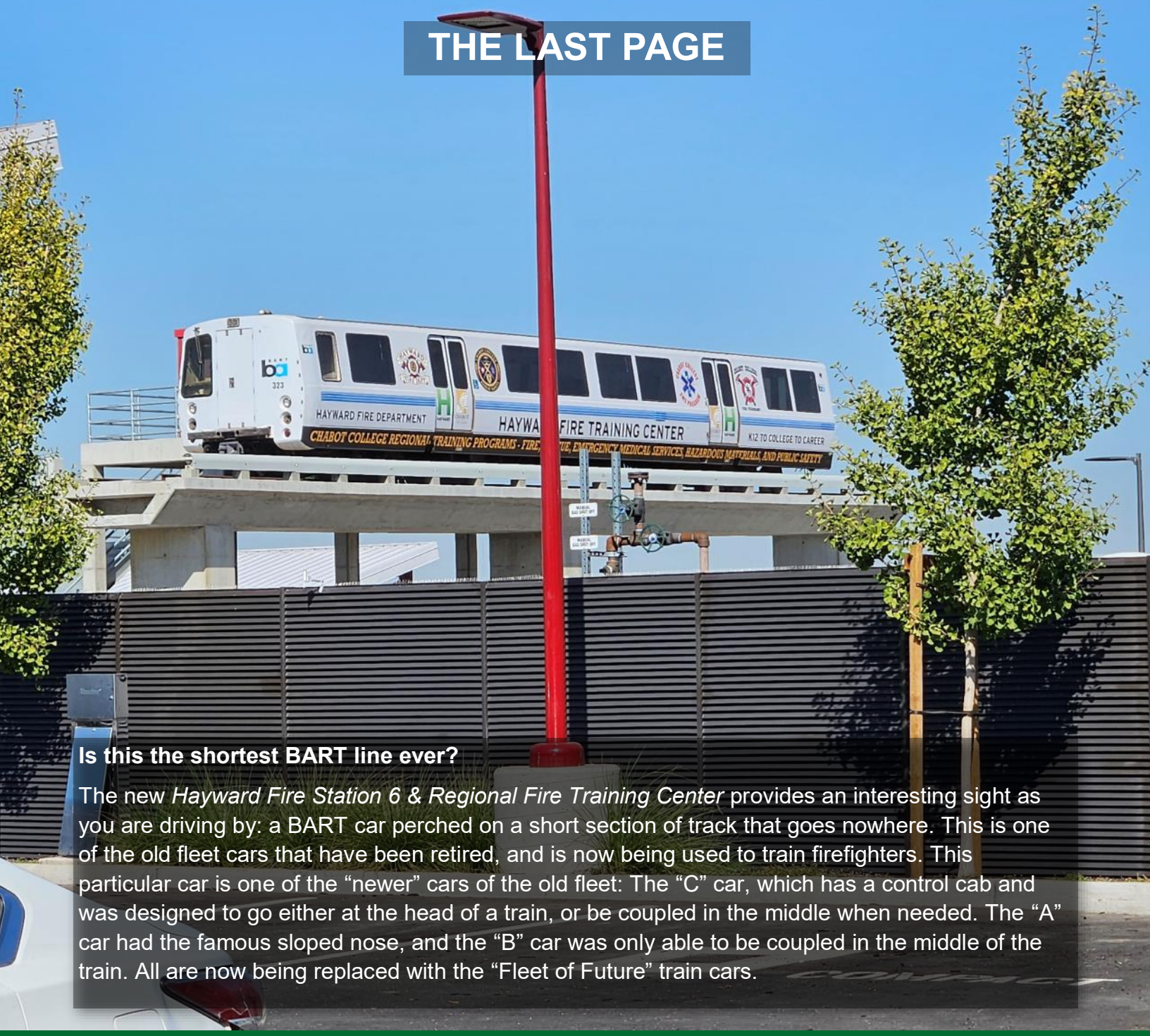
Many photos & videos are hosted at: https://photos.google.com

Click on "Go to Google Photos", if offered.

Login with this email and password: BAGRSvideos@gmail.com BestClub4014

The upper-left corner has a pull-down menu to select ALBUMS. Then click on the album of interest.

THE LAST PAGE



Is this the shortest BART line ever?

The new *Hayward Fire Station 6 & Regional Fire Training Center* provides an interesting sight as you are driving by: a BART car perched on a short section of track that goes nowhere. This is one of the old fleet cars that have been retired, and is now being used to train firefighters. This particular car is one of the "newer" cars of the old fleet: The "C" car, which has a control cab and was designed to go either at the head of a train, or be coupled in the middle when needed. The "A" car had the famous sloped nose, and the "B" car was only able to be coupled in the middle of the train. All are now being replaced with the "Fleet of Future" train cars.

TRELLIS AND TRESTLE

Editor: Roger Nicholson, Assistant Editor: Noëlla Simmons

Regular Contributors: David Frediani, Henner Meinhold, Richard Murray, Bill Ralph, Mick Spilsbury

JOIN US AT: BAGRS.ORG FACEBOOK INSTAGRAM