TIMETABLE

SEPTEMBER 2022

IT'S TIME TO RENEW YOUR TGRS MEMBERSHIP - $30/HOUSEHOLD DUE JULY 1ST (FOR 2022-2023)

Please make check payable to TGRS and send to:

Margaret Torres Nelson, Treasurer
454 E Cedarvale Rd
Tucson, AZ 85704

or send dues from your bank via Zelle to 317-903-9115

BREAKING NEWS

The first meeting of the new year will be September 10th @ 9:00 am in the Education Room at Tucson Botanical Gardens

Chairs will be provided.
Hope to see you there!

Monthly Luncheon

The next social luncheon will be Wednesday, September 28th at 11:15 am at the Red Garter Bar & Grill. Let Chuck know if you plan to attend.

chuckcooktucson@gmail.com

Train Spotting in Casa Grande & Eloy

Thomas Preisner was in Casa Grande last week, where he had a great time, saw the daily local (2xGP60) shunting for approximately 2 hours, and also saw 3 intermodal trains.

Then he saw another train coming but he was not going to bother, little did he know that this was a UP MOW train! Here's his report:

"I had never seen one before, so I got into my car and raced south (tracks are next to the street) and stopped to take some pix. I was not satisfied so I raced some more until I was in Eloy (next town over from Casa Grande) and this time I hit the jackpot. Wow! So cool! Enjoy."

<u>Union Pacific Maintenance of Way Machine</u>

links

Albuquerque Botanical Gardens

John Fennema visited the Albuquerque Botanical Gardens over the summer and took some great photos.

TGRS - FaceBook

Jerry Tulino stopped at the transportation museum while visiting St. Louis last month and took these pics.

TGRS - FaceBook


St. Louis Transportation Museum

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September's BOD meeting will be Wednesday, September 7th, 1:00pm at Gary & Peggy Martin's.

Fall Meetings

Train Ticket	Train Ticket
September 10th - TBG (Ed Room)	**9:00 am**
October 8th - Ron & Helen Koehler	**Trains 9:00 Meeting 10:00**
November 12th - Oracle Kids' Garden - Craig Anderson	**Trains 9:00 Meeting 10:00**

CLASSIFIED

BLACK FOREST
HOBBY SUPPLY COMPANY I USA

Discount information on TGRS website

Gina Blackwell will be hosting a sale for club members of much of Barry's collection sometime in October. Look for an announcement.

Mark your calendars for the Gadsen-Pacific Swap Meet on Sunday, November 13th

Trains: Past, Present, & Future

The world's first 100% hydrogen passenger trains are now running in Germany: Fast Company article

General Motors Electro-Motive division modernized the railroad industry with its revolutionary diesel and diesel-electric locomotives (see below)

ELECTRO-MOTIVE EDUCATION

General Motors' Electro-Motive Division modernized the railroad industry with its revolutionary diesel engines and diesel-electric locomotives.

General Motors is an automaker. However, GM also has a storied past in various industries that many might not consider. In the 1930s, GM's Electro-Motive Division began producing many popular diesel-electric locomotives and the diesel engines that powered them for America's railroads. In fact, General Motors largely championed the dieselization revolution that forever changed the railroad industry. Here's how.

Before the advent of the automobile and our vast highway and interstate network, railroads were the medium that connected towns and cities, and the routes they traveled helped shape our county. As the railway system evolved, it played a vital role in transporting passengers and freight to new destinations. The Transcontinental Railroad's completion in 1869 connected the East and West making cross-country rail travel possible. You may notice when driving today's highways that towns and cities are generally spaced 50 to 100 miles apart. That spacing isn't coincidental—it was the distance that steam locomotives could travel before needing to refill its tender with water. Railroads set up "water stops" along their track route and settlements often emerged as locomotive replenishment afforded time for onloading and offloading passengers and freight. As highways were built, they often paralleled railways, and many of the once-trackside towns and cities remain today. Some even evolved into major metropolitan areas.

Early steam locomotives evolved into massive engineering marvels, but the operating principle remained largely the same as the steam engine developed by James Watt in 1776. While steam power was quite effective, steam locomotives were costly to operate and maintain. They consumed large volumes of water and fuel and the frequent replenishment stops lengthened passenger travel time. As highly mechanical machines, strict maintenance schedules had to be followed to maximize locomotive service life. Roundhouses and engine shops were strategically placed along the route where regular maintenance and repairs were carried out by an army of trained workers 24 hours a day.

Automakers found gasoline internal combustion engines the most flexible and successful forms of propulsion for the automobile industry. Railroads began considering internal combustion engines as an economic solution to steam power when hauling passengers over shorter routes. McKeen Motor Car Company of Omaha, Nebraska, built the first rail motor car with a gasoline engine producing 100 hp in 1905. Several others followed and, while reasonably successful for branch line work, the mechanical geartrain couldn't haul heavy payloads.

Harold Hamilton was a steam locomotive fireman and engineer before managing a motor truck company. He understood the challenges of operating and maintaining steam locomotives as well as the advantages that internal combustion engines possess. During World War I, the government approached Hamilton about equipping his motor trucks with flanged wheels for rail use. The effort proved reasonably successful. Once the war ended, he established Electro-Motive Company in Cleveland, Ohio, in August 1922 to develop a rail motor car with an internal combustion engine capable of rivaling steam power.

Electro-Motive produced its first rail motor car in 1924. Winton Engine Company, also of Cleveland, supplied the gasoline engine—a six cylinder that produced 175 hp—as the prime mover. It powered General Electric's propulsion system, which consisted of a generator that provided current to electric traction motors connected to the wheels. While the gasoline-electric rail motor cars were successful, railroads asked Electro-Motive for even greater hauling capacity and top speed. Winton ultimately produced a 400 hp eight-cylinder engine, but it wasn't enough. Larger displacement was required to attain greater output, but the sheer size and weight of such an engine was unreasonable for a standard-size rail motor car body.

In addition to the gasoline engines that Winton Engine Company sold Electro-Motive during the 1920s, it produced its own diesel engines

ROCKY ROTELLA ROCKY ROTELLA & COURTESY OF GENERAL MOTORS

Photo courtesy of General Motors

for stationary and marine applications. Winton launched a program to develop a compact four-stroke diesel engine for rail motor car applications. Vice-president of General Motors Research Laboratory Charles Kettering also believed that then-current diesel engine design could be greatly improved. He conferred with Winton, and in 1928 tasked his research group with developing a two-stroke diesel engine. Despite Electro-Motive being Winton's largest customer, general demand for its internal combustion engines was so great that it taxed Winton's production capacity. The company couldn't financially incur the expense of operation expansion while continuing development of its four-stroke diesel engine. Winton Engine Company was offered for purchase, and General Motors acquired it in June 1930 renaming it Winton Engine Division.

Then, in December 1930, the corporation acquired Electro-Motive Company, ultimately renaming it Electro-Motive Division in 1942.

General Motors tested several new diesel engine designs during the early 1930s. One successful result was the Winton 201 series—a two-stroke eight cylinder that produced 600 hp at 720 rpm. The Burlington Railroad selected a modified Winton 201A for its stainless steel streamlined passenger train built to showcase the advantages of lightweight construction and diesel-electric propulsion. On May 26, 1934, the Zephyr made a dusk-to-dawn run from Denver to Chicago, completing the 1,000-mile trek in just over 13 hours at an average speed of nearly 78 mph with top speed exceeding 112 mph! The record-setting run—which otherwise took 26 hours with steam power—firmly solidified the future of the diesel-electric locomotive in the railroad industry.

With the dawn of the diesel-electric age upon the railroad industry, General Motors developed its own line of locomotives. Construction of an all-new Electro-Motive locomotive assembly plant in LaGrange, Illinois, began in 1935. The first locomotive produced was a 100-ton yard switcher powered by the Winton 201A for the Santa Fe Railroad on May 20, 1936. Other locomotive manufacturers such as American Locomotive Company (or ALCO), Baldwin Locomotive Works, and eventually General Electric began developing and/or production of their own diesel-electric locomotives about this time.

As running hours accumulated, operational challenges with the Winton 201A became apparent. Taking the knowledge gained from the 201 program, General Motors began developing an entirely new

Above: For years, steam locomotives powered America's railways. The trend toward dieselization began in the 1930s, but many railroads stayed with steam locomotives for several more years. The Union Pacific's last new steam locomotive was its 844, delivered in 1944. Designed for high-speed passenger service, with a top speed in excess of 100 mph, the 844 has never been removed from that railroad's active engine roster. Today, it's part of Union Pacific's Heritage Fleet and travels the country for special excursions. Above right: Union Pacific's Big Boy was among the largest and most powerful steam locomotives ever produced. Measuring 132 feet long, weighing 1.2 million pounds, and delivering 7,000 hp, a single Big Boy had enough tractive effort to pull a five-mile-long freight train from a stop! Retired in the early '60s, Union Pacific performed a complete restoration and returned the 4014 to the rails in 2019. Many other locomotives have been preserved by various organizations across the country. Seeing and hearing one in person is awe-inspiring.

Above: The M300 was Electro-Motive's first rail motor car produced in 1924. Upon its presentation, railroads were interested but needed to be assured of its reliability as maintenance downtime and schedule delays impacted profitability. Its success paved the way for the diesel-electric locomotives that followed. Above middle: Based on success of its inline eight-cylinder Winton 201A diesel engine, General Motors developed an all-new 567-series diesel engine as a prime mover for railroad use in the late '30s. The 567 was available in a variety of configurations, and its V16 offering produced 1,350 hp at 800 rpm. It was a highly successful design that evolved over the years. Above right: In 1935, General Motors began construction of a new assembly plant in LaGrange, Illinois, where its Electro-Motive Division produced diesel-electric locomotives and their propulsion systems. The complex eventually became Electro-Motive's headquarters.

Right: General Motors developed the first mass-produced diesel-electric locomotive capable of performing high-speed passenger and heavy-duty freight service. The attractive F-series unit was highly successful for Electro-Motive and the railroads that purchased them. The F7 depicted in this 1950 GM promotional photograph featured the 16-567 diesel engine, whose output had increased to 1,500 hp by then. The three-unit lash up delivered 4,500 hp and could be operated by a single crew.

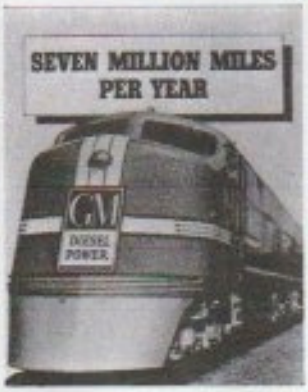
two-stroke diesel engine. The 567 series—aptly named for each cylinder displacing 567 ci—featured a vee design with a cylinder-bank angle of 45 degrees for more compact packaging than the inline Winton 201A. Its modular design allowed for V6, V8, V12, and V16 variants with output that ranged from 600 hp to 1,350 hp, respectively, increasing versatility for a wide range of applications. The new 567-series engine and the electric generators and traction motors designed to complement it were produced at LaGrange.

Having a state-of-the-art diesel-electric propulsion system, Electro-Motive set out to produce a single diesel-electric locomotive capable of both heavy-duty freight and high-speed passenger service. The new F-unit, powered by a single V16 567-series diesel engine (the "F" signifying 1,400 hp, rounded up from 1,350 hp), debuted in 1938. It was sleek, attractive, and functional. As a promotional campaign to showcase its abilities, Electro-Motive loaned a lash up of F-units to several railroads for trial testing in various conditions accumulating 84,000 miles in the process.

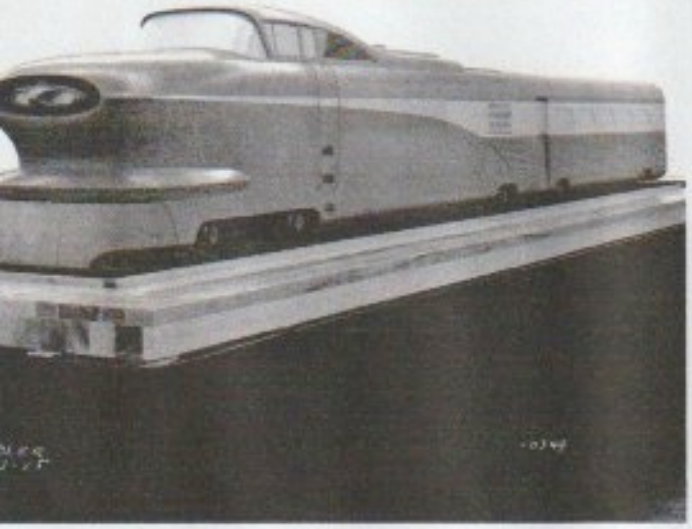
When compared to steam locomotives, the diesel-electric locomotive reduced operating and maintenance costs up to 50 percent each, operated uniformly and dependably in all weather conditions, reduced travel time, operated cleaner and quieter, and could be lashed together to increase total power while requiring a single operating crew. Dieselization was in full swing and Electro-Motive Division was the catalyst for change.

Railroads began ordering Electro-Motive's F-unit locomotives. By 1940, the LaGrange assembly plant was producing about one new locomotive per day. Electro-Motive went on to develop diesel-electric locomotives for a variety of capacities including yard/terminal switchers, road switchers, and even larger heavy-duty freight and passenger locomotives. The 567-series diesel engine evolved into larger and more powerful versions. In the modern era, Electro-Motive was producing diesel engines displacing as much as 710 ci per cylinder, as large as V20, and generating more than 6,000 hp.

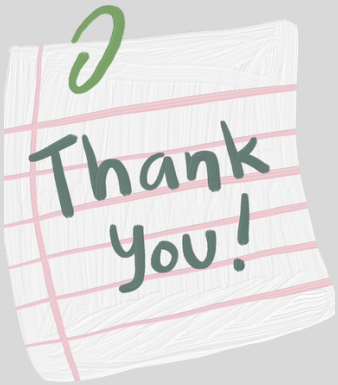
General Motors and its Electro-Motive Division remained a railroad industry leader until April 2005. Facing fierce competition from other locomotive manufacturers, along with tough economic times, GM sold Electro-Motive to an investment group. In the 75 years that General Motors produced diesel-electric locomotives, it left a legacy of revolutionizing the diesel engine and railroad industries. Its products were the face of railroading to generations of Americans and will likely remain so for generations to come.



Above: A variety of diesel-electric locomotives were designed and produced by Electro-Motive in La Grange. Yard switchers were among its first offerings. **Above middle:** Notice the Union Pacific streamlined passenger train (the M-10000) under construction when this photo was taken. **Above middle:** Diesel-electric locomotives possessed many advantages over steam locomotives. Low maintenance and reliability were the attributes that railroads found most appealing. General Motors boasted the popularity of its diesel-electric locomotives calling out total cumulative miles traveled annually. **Above right:** Much like vehicle assembly plants, diesel-electric locomotives were built in subassemblies. The body drop was one of the final stages at the Electro-Motive plant. Here, the car body is lowered onto the power truck assemblies, which were fitted with electric traction motors.



Above: General Motors approached train styling in the same manner as vehicle styling. Designers constructed clay bucks to visually compare exterior cues for the final design. This clay mockup is of the experimental Aerotrain that Electro-Motive produced in 1955. **Above right:** As passenger travel moved from trains to airplanes, Electro-Motive focused its developmental efforts on locomotives designed specifically for freight service. As such, the SD (or Special Duty) series, and those that followed, gained a more rugged and industrial appearance.



Trainspotting and UP MOW pictures courtesy of Thomas Preisner. Albuquerque Botanical Gardens courtesy of John Fennema. St. Louis Transportation Museum courtesy of Jerry Tulino. GM article courtesy of Dennis Mahar.

The Timetable is published monthly by the Tucson Garden Railway Society and features news, photos, and articles from club members in Southern Arizona.

Editor: Claudia Nelson, Email: editor@tucsongrs.org

The Tucson Garden Railway Society is a 501(c)(3) nonprofit corporation incorporated in Pima County, Arizona. Society members are interested in all areas of garden and modular large scale railroading. We welcome new members and hope you will consider joining. Members help each other build layouts and learn about railroading and modeling. The TGRS dues are $30.00 per year per household and are due on June 30th of each year. For new members, dues are pro-rated at $2.50 per month remaining in the year until June 30th, the first year. Additional name badges cost $1.00 per badge. If you are interested in TGRS please contact one of the officers at the e-mails listed above. If you wish to join immediately, send a check and your name, address and telephone number and the names for any additional badges to: Jerry Tulino, 6911 E. Baker, Tucson, AZ 85710 . Membership application link is belos:

TGRS Membership Application