Carolina Conductor

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Preserving the Past.
Active in the Present.
Planning for the Future.

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Woodmen of the World Bldg.
721 East Poinsett Street
Greer, SC 29651-6404
Third Friday of the Month at 7:00 pm

Hub City Railroad Museum and SOU Caboose #X3115:
Spartanburg Amtrak Station
298 Magnolia Street
Spartanburg, SC 29301-2330
Wednesday 10-2 and Saturday 10-2

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Articles and club news due by the 2nd Wednesday of month.

Electro-Motive
Part 1

Electro Motive Division (EMD) was an American manufacturer of diesel-electric locomotives, locomotive products, and diesel engines for the rail industry. The company is now owned by Caterpillar, through its subsidiary, Progress Rail Services Corporation.

EMD traces its roots to the Electro-Motive Engineering Corporation, a designer and marketer of gasoline-electric self-propelled rail cars founded in 1922 and later renamed Electro-Motive Company (EMC). In 1930, General Motors purchased EMC and the Winton Engine Co., combining the two to form its Electro-Motive Division in 1941.

Harold L. Hamilton and Paul Turner founded the Electro-Motive Engineering Corporation in Cleveland, Ohio, in 1922, soon renaming it to Electro-Motive Company. The company developed and marketed self-propelled railcars using General Electric's newly developed internal combustion-electric propulsion and control systems. Hamilton started his railroading career as a fireman, then locomotive engineer, on the Southern Pacific Railroad, then became a manager with the Florida East Coast Railway. On leaving railroading for an automotive marketing position in Denver, Hamilton, aware of recent developments in electric propulsion, the technology of heavy vehicles, and the needs of branch line services of railroads, recognized the opportunities for internal combustion power with railroading. Financing himself, he quit his truck sales position and set up shop in a hotel with his partner and a designer. In 1923 EMC sold two gasoline-powered rail motor cars, one to the Chicago Great Western and the other to the Northern Pacific. EMC subcontracted the body construction to St. Louis Car Company, electrical components to General Electric, and the prime mover to Winton Engine Company. The motorcars

Early EMC rail car.

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Arrivals

Early EMC/EMD Diesel Designs

EMD Models
1—GP-9
2—F-3
3—BL-2
4—GMDH-1
5—LWT-12
6-RSD-1325
7—FL-9
8—F-7A

Departures

Continued from Page 1 - *EMD*

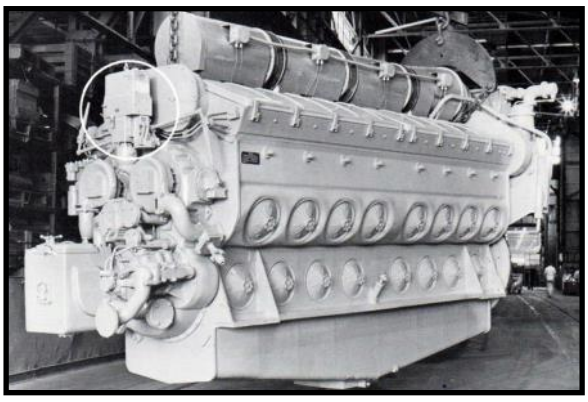
were delivered in 1924 and worked well, fortunate for the fledgling company, because the sales were conditional on satisfactory performance. In 1925, EMC entered full-scale production, selling 27 railcars.

In 1930 General Motors (GM) was seeking to improve their diesel technology and broaden its range of applications. They purchased the Winton Engine Company who, in addition to their Diesel products, sold non-Diesel engines for EMC-developed rail motorcars. The combined resources of GM and their new Winton subsidiary were focused on developing Diesel engines with improved power-to-weight ratios and output flexibility suitable for mobile use. GM saw EMC's role in marketing and applications development as fitting their objectives and purchased the company shortly after the Winton acquisition, renaming it Electro-Motive Corporation (EMC). In 1933 EMC designed the power setups for the *Zephyr* and *M-10000* streamliners, a breakthrough in the power and speed available with their propulsion systems. The *Zephyr* used the first major product of the new GM-Winton venture, the 600 hp Winton 201A 2-stroke Diesel engine.

Encouraged by the success of the new custom streamliners, EMC invested in a new locomotive factory and started development work on the locomotives that it would produce.[6][7][8] The new headquarters on 55th Street in McCook, Illinois, west of Chicago, remains the corporate headquarters. The 1935 EMC 1800 hp B-B boxcab development design locomotives featured the multiple-unit control systems that became the basis of cab/booster locomotive sets, and the twin 900 hp Winton Diesel engine power unit format that would be adopted for the Budd-built *Zephyr* power units in 1936 and EMC's E series streamlined passenger locomotives that the new factory began producing in 1937. Prior to their introduction of the E units EMC was in production of switch engines, which remained the mainstay of their production through the late 1930s.

EMC boxcab design from 1935.

In 1938 EMC started production of locomotives using GM's new 567 engine, which upgraded the horsepower to 2000 per locomotive unit and increased reliability. The 567, named for its displacement-per-cylinder of 567.45 in³ (bore 8½ inches, stroke 10 inches), was a two-cycle, roots-blown, uniflow-scavenged, unit-injected, engine with overhead camshafts and four exhaust valves per cylinder. It was built as a V-6, V-8, V-12 and V-16. Charles F. Kettering and the General Motors Research Corporation oversaw its development.



EMD 567 diesel engine.

GM-Winton-EMC's long development efforts put the company in a unique position relative to other developers of diesel-electric locomotion who had remained focused on the lower power and speed requirements of switch engines. Their nearest competitor was the American Locomotive Company (ALCO), who started production of less-developed Diesel locomotives to compete with the E-units in 1939. EMC's other main competitor, the venerable Baldwin Locomotive Works, had their development work in diesel delayed by their belief through 1930s that the future of mainline service remained with steam, and by financial difficulties that effectively froze their diesel development while EMC and ALCO continued theirs. Baldwin's response to the challenge of the E-units was to develop a steam locomotive design that pushed beyond the limits of practicality.

Passenger trains made little money for the railroads, but

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replacement of steam engines with reliable diesel units could provide railroads with a crucial difference for profitability. With standardized production of locomotives, EMC simplified the process for ordering, manufacturing, and servicing locomotives and introduced economies of scale that would lower unit costs. The lowered hurdles for ordering Diesel locomotives lent momentum to their market in the last years before US entry into World War II. The performance of the new 567 engine in passenger locomotives built confidence in the viability of diesel power for freight service. The market for mainline passenger locomotives also gave EMC experience and future contacts for breaking into the largest market, freight service.

In 1939 the company built a four

EMC diesel model EA on the ATSF.

-unit freight locomotive demonstrator, the FT, and began a tour of the continent's railroads. The tour was a success. Western railroads saw that the Diesels could free them from dependence on scarce water supplies for steam locomotives. In 1940, after incorporating dynamic braking at the suggestion of customers, they were receiving their first orders for the new freight locomotive.

1940-60

General Motors merged EMC and part of Winton Engine to create the Electro-Motive Division on January 1, 1941. Production of Winton's non-locomotive products (large submarine, marine, and stationary diesel engines) continued under GM's Cleveland Diesel Engine Division for another twenty years.

In January 1941 EMD delivered the first FT unit to the Atchison, Topeka and Santa Fe Railway, numbered Unit 100, and through that year they were in full-stride production of passenger and freight locomotives. World War II temporarily slowed EMD's locomotive production; Navy ships gained priority for diesel power and the petroleum crisis of 1942-43 made coal-fired steam a more attractive option. The War Production Board stopped production of new passenger equipment between September 1942 and December 1944. By 1944, Diesel locomotive production for freight service was regaining momentum as more locomotives were needed to haul wartime supplies. By the time the FT model was replaced in 1945, 555 cab units and 541 booster units were produced.

EMD FT demonstrator locos circa 1940.

EMD emerged from the war years with major advantages for over competitors in Diesel locomotive production, having entered the war years with a fully developed line of mainline road Diesel locomotives while war production allocations restricted their competitors, principally the American Locomotive Company (ALCO) and the Baldwin Locomotive Works, to selling mainly diesel switchers and steam locomotives of pre-existing designs. That gave an advantage to EMD's state of technical development with higher powered Diesels in the critical postwar years. New model passenger EMD E-units were delivered starting in February 1945. New models of their freight locomotive followed later in 1945 and 1946.

By the late 1940s most American railroads had decided to transition from steam to diesel power, known as dieselization. The demand for diesel-powered passenger service did not grow at the same rate as for freight service, as air and automobile travel were the burgeoning modes of passenger travel. Nevertheless, the lower profit margins of passenger service made the cost advantages of diesel over steam more critical and steam power was increasingly seen as dirty, smelly, and dated among the travelling public. To meet post-war demands, EMD opened another locomotive production facility in 1948 at

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Rare Mileage

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Cleveland, Ohio.

ALCO-GE was EMD's most serious competitor during the Dieselization era, having produced the first road-switcher diesel locomotives in 1941 and gained about a 40% market share of diesel locomotives, mostly for switching and short-haul applications, as of 1948. ALCO's attempts to develop higher powered locomotives for mainline service had been less successful, as they were plagued by reliability problems. In 1948 the ALCO-GE partnership developed a prototype gas-turbine-electric locomotive; customer delivery began in 1952. Baldwin's early ventures into road Diesel production, while innovative, borrowed ill-suited design and production concepts from steam and electric locomotives, and were not sufficiently reliable to gain acceptance. Baldwin's postwar steam turbine-electric locomotives were spectacularly unsuccessful. Fairbanks-Morse entered the locomotive industry at the end of the war by partnering with General Electric to produce "Erie-built" locomotives using F-M's opposed-piston engine that they had developed for marine use. In early 1949 GE ended the partnership, undermining F-M's tentative foothold in the industry. Facing desperation as the market for steam power collapsed, Lima-Hamilton produced a total of 174 diesel locomotives of various models starting in 1949 but it was too little too late to make the company a serious player in the Diesel business.

By 1950 it was clear that EMD's competitors could not crack their position in mainline road diesels and their introduction of the EMD GP7 road switcher locomotive in 1949.

In 1949, EMD opened a new plant in London, Ontario, Canada,

Southern Rwy GP-7 model locomotive.

which was operated by subsidiary General Motors Diesel (GMD), producing existing EMD as well as unique GMD designs for the Canadian domestic and export markets. That same year, EMD introduced a new locomotive that broke into the short-haul market dominated by ALCO while also serving as a competent long-distance hauler, the EMD GP7. The road-switcher design resembles an expanded diesel switcher, with the engine, main generator, and other equipment covered with an easily removed hood (thus more recent name for these locomotives, hood units). This hood being narrower than the locomotive, the crew has visibility in both directions from a cab placed near one end and access to the exterior of the locomotive while underway. The structural strength in the hood unit is in the chassis, rather than in a carbody as with EMD's earlier models (The sag-prone chassis of the GP7 became a known flaw, corrected with EMD's later road-switchers). Owing to their ease of maintenance and versatility, most locomotives produced in the North America for domestic use since the 1960s have been hood units.

GMD-1 Canadian National switcher locomotive.

The 1950s left EMD with only one serious competitor, the General Electric Company. Lima-Hamilton failed first, in 1951 merging with Baldwin to form Baldwin-Lima-Hamilton. Baldwin's own position was precarious, with their market share continuing to dwindle as they continued to offer what were essentially development design locomotives in the road diesel market. By the mid-

EMD E-6 Southern Railway #2800.

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Marker Lights

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EMD Model 40 industrial loco.

1950s Baldwin was effectively shut out of the market but made one more attempt at steam turbine-electric power, resulting in one customer delivery, then left the locomotive business in 1956. Fairbanks-Morse, after partnering with General Electric, Westinghouse, then Canadian Locomotive Company to produce a series of

locomotives that never established a solid reputation and sold poorly, left the locomotive field in 1963. ALCO remained competitive while backed

EMD E-5 at Illinois Railroad Museum.

by the industrial might of General Electric, however, GE dissolved the partnership in the wake of ALCO's lackluster development of higher powered engines for mainline road locomotives. General Electric's new subsidiary GE Rail took over the ALCO-GE gas-turbine-electric venture in 1953. By 1956 GE was marketing its own universal series Cooper-Bessemer powered diesel-electrics as export locomotives. In 1959 the U25B was the first of GE's road locomotives powered by GE's FDL-16 Diesel engine, which would seriously challenge EMD's position in the mainline locomotive market. From the mid-1950s onward, ALCO's position slipped steadily until the company went out of business in 1969.

EMD SD-9 Norfolk Southern #202.

The 567 engine was continuously improved and upgraded. The original six-cylinder 567 produced 600 hp , the V-12 1,000 hp, and the V-16 1,350 hp. EMD began turbocharging the 567 around 1958.

Wanted—Articles for the Carolina Conductor

Submit an article of 200 words or more with some photos and captions and see them in print. Every one of us has some unique railroad experience that would make interesting reading for our membership. Your editor always needs more contributions of local railway history and news.

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