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Electro-Motive's GP7, introduced in 1949, wasn't the first road switcher. However, it proved to be among the most popular, with more than 2,700 built. These locomotives, with similar offerings from Alco and others, soon eliminated steam locomotives from railroads across North America. EMD

— INTRODUCTION —

Whether you are a railfan, modeler, history buff, or any combination thereof, this book will take you through the history of diesel locomotive evolution and guide you through the hundreds of different models and variations that have been produced since the 1930s.

Starting in the 1920s, manufacturers realized that pairing an internal-combustion engine with a generator and electric motors on the axles had great promise for locomotives. Starting with small switching locomotives and progressing to ever-larger road locomotives, diesels eventually overtook steam locomotives. By the 1960s, steam was history, and diesel progression continued with the evolution of microprocessor control and AC traction motors. Today's 4,400-horsepower locomotives are powerful, fuel-efficient, reliable, technological marvels, but they still trace their roots to the pioneering locomotives of the 1930s and '40s.

Builders and models

By the 1940s, five major diesel locomotive builders had emerged: Electro-Motive (EMD), American Locomotive Co. (Alco), Baldwin, Fairbanks-Morse, and Lima. By the late 1950s this had dwindled to two—EMD and Alco—but then General Electric joined in, shortly relegating Alco to third place before Alco finally left the business in 1969. The market has belonged to EMD and GE since then.

Manufacturers offer a variety of models for different purposes, including switching, passenger, and freight service, with each often available in varying horsepower ratings. Most diesel locomotive models remain in production for several years, unlike automobiles, where a new model is introduced each year. Locomotive builders generally introduce new models for significant changes, such as a boost in horsepower or change in engine (prime mover).

Details and spotting features often change during each locomotive's production run. These changes can be large or small and reflect modifications to upgrade performance, replace troublesome components, cut manufacturing costs, or standardize components with other models. Examples include changes in grille, louver, and access door style or location, handrail style, window style or location, frame length, or cab and hood shape and style.

Other spotting features involve optional components. These usually vary by railroad preference, and can encompass multiple options offered by a builder. Examples include horn and bell (style and location), fuel tank size, headlight style and location, truck type, high or low nose (for first- and second-generation hood units), and



Long Island Rail Road No. 401, a 100-ton boxcab built by Alco/GE/Ingersoll-Rand, is often credited with being the first road diesel-electric in the U.S. Long Island Rail Road

whether a locomotive is equipped with dynamic brakes or a steam generator.

Locomotive model numbers or designations sometimes make sense, (often following the horsepower rating and number of axles), but often they don't—especially for EMD, long the dominant locomotive builder. The chapters on manufacturers include a description of each builder's nomenclature.

What's included

This book offers a summary of standard-gauge, heavy-duty diesel-electric models built by major manufacturers for use in the U.S., Canada, and Mexico. Builders covered include EMD, GE, Alco, Baldwin, Fairbanks-Morse, and Lima, along with their Canadian subsidiaries. It does not include small industrial switchers, electric locomotives, locomotives built for export, turbine locomotives, or experimental locomotives (or some locomotives where only a few were built).

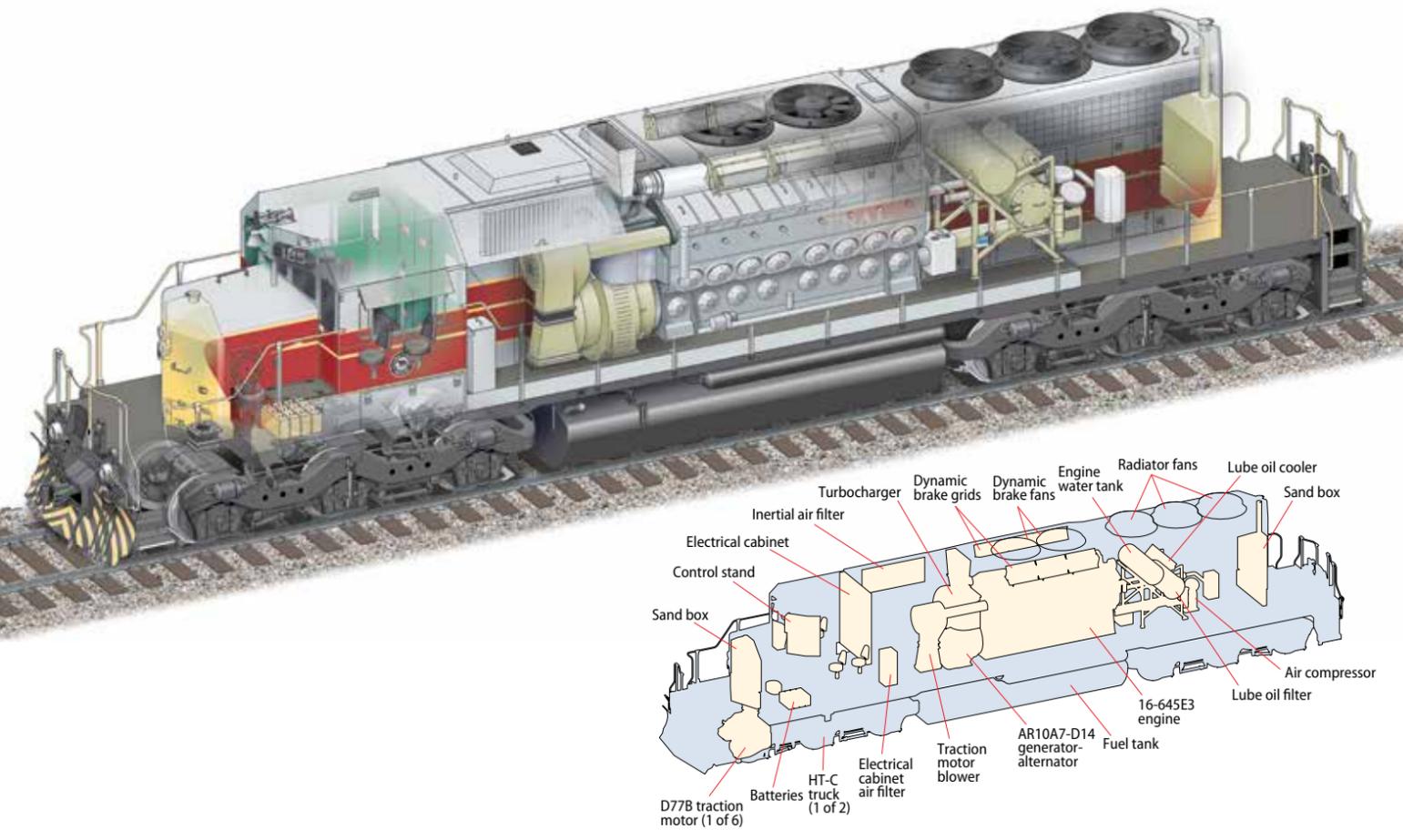
Chapters 5 through 9 provide a model-by-model listing for each manufacturer, with basic spotting and identification features and information for each type. Summaries for each locomotive type list the major buyers for each model. If space allows, all initial buyers are included; some

include as-delivered road numbers (secondary owners are not included).

Tables in each of these chapters provide the total number built for each locomotive type, timelines of the period each was built (black lines), with an estimation of the years they remained in service (shaded gray lines). Use these as general guides, as with the thousands of locomotives built (and later rebuilt) it's impossible to verify the exact dates that all samples of a certain model are out of service.

Chapter 11 includes diesel rosters for more than 120 individual railroads, including road numbers (and changes) and dates built. Most are historical summaries of railroads that no longer exist (mainly through mergers, sales, or abandonment), but current summaries of current Class 1 railroads are included.

Railroads began rebuilding older locomotives in the 1950s. Several railroads embarked on major rebuilding programs from the 1960s onward, and many independent shops provide rebuilding services as well. Chapter 10 provides a summary of this, but the sheer number of rebuilds—not to mention the myriad new designations and model numbers given them—precludes providing spotting and roster information for all of them.



— CHAPTER TWO —

How diesel locomotives work

This cutaway view of an EMD SD40 shows how the diesel engine and other components fit together on a locomotive platform. Rick Johnson

A diesel-electric locomotive is basically an electric locomotive that carries its own portable power plant driven by a large diesel engine. The engine turns a generator or alternator, which provides electricity for traction motors mounted on the axles. The specifics of how this is done vary by manufacturer and have evolved over time, but having a basic knowledge of how diesels work will help you understand why diesel locomotives are designed the way they are, what their strengths and limitations are, and what the differences are among the various models.

The diesel engine

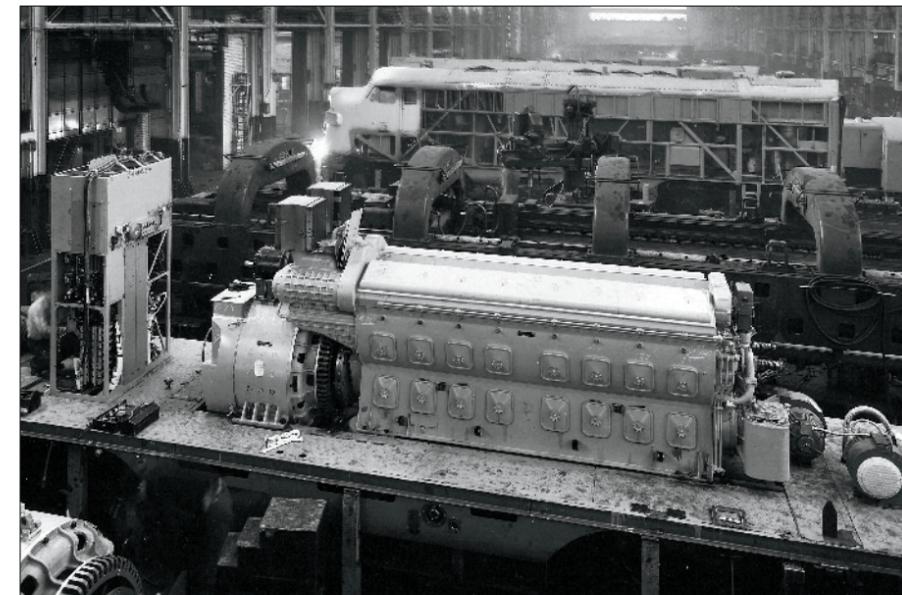
Diesel engines are built to many different designs, but the principle of each is the same. A series of pistons, each in a cylinder, move up and down and in doing so rotate a crankshaft that runs through the engine. Unlike a gasoline engine, which uses a spark to ignite the fuel in each cylinder, a diesel engine fires by compression. This is done by compressing the intake air to 500 psi or higher, whereupon it reaches a temperature of about 1,000 degrees F. An atomized spray of diesel fuel is then injected and burns, propelling the piston.

Diesel engines are either four-cycle or two-cycle designs (see the following pages). A four-cycle engine completes four piston strokes (two up, two down, producing two driveshaft revolutions) to get one power stroke. The process starts with the intake stroke (the piston descends and clean air is drawn into the chamber), followed by the compression stroke (the piston moves upward and compresses the air), power stroke (fuel is admitted and burns from the high temperature gained by compression, forcing the piston downward), and exhaust stroke (the burned gases are discharged as the piston moves upward). Four-cycle engines are made practical by turbocharging, which we'll discuss in a bit.

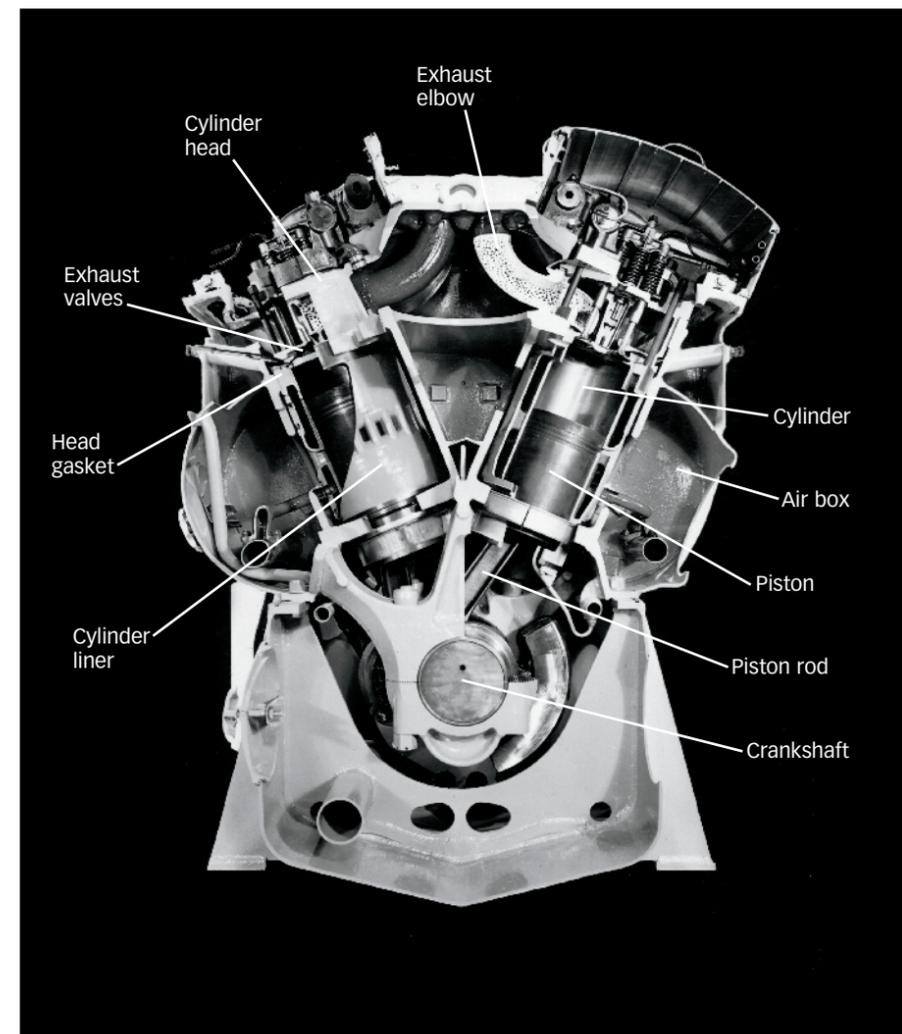
A two-cycle engine accomplishes the same tasks with just two strokes and one revolution of the crankshaft, requiring the above steps to be accomplished in much less time. To do this, the cylinder simultaneously takes in clean air and expels exhaust gas on the piston downstroke, so that on the upstroke the new air is being compressed and is ready for ignition when the piston reaches the top of the cylinder.

By 1920, the diesel engine had proven itself practical for many applications, but engines were big, heavy, and slow. The main design challenge in reducing the size and weight was that fuel has to be forced into the cylinder at extremely high pressure (to combat the pressure required for the combustion air in the cylinder). The resulting long fuel lines needed to build up the pressure took up a lot of space. The breakthrough came in the 1920s with the development of injectors that could force air into the cylinder at the required pressure, and do it at the cylinder.

Engines from several manufacturers powered early railroad locomotives and motor cars, including Ingersoll-Rand and

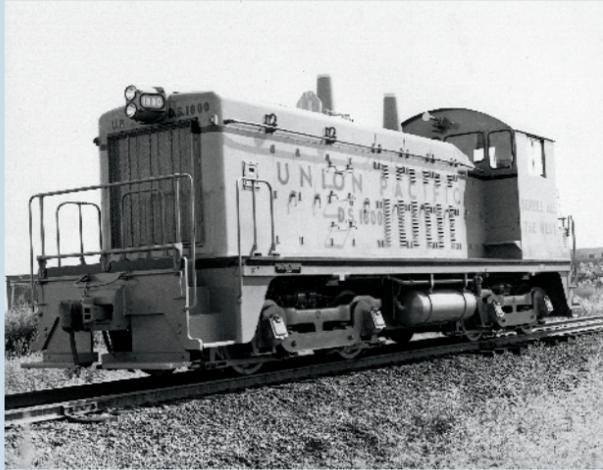


This 1949 view of the erecting floor at EMD shows a 567 diesel engine, generator (on the deck at the left end of the engine), and electrical cabinet (far left) in place on an F7 frame. An FP7 is taking shape in the background. EMD



This cutaway cross-section view shows an Electro-Motive Division 567 diesel engine, a V-style design with cylinders at a 45-degree angle. EMD

SW7, TR4



Union Pacific No. 1800 is a late SW7, indicated by the straight-top cab windows. The hood has the single taper at the cab of later SW-series locomotives. *EMD*



The TR4 is a cow/calf version of the SW7. Chesapeake & Ohio No. 6000 was one of 13 sets built. *EMD*

The 1,200-hp SW7 has two exhaust stacks centered on the hood roof, a large front grille that extends to the bottom of the hood, and six rows of louvers along the hood sides with a gap between the top and bottom sets. Early SW7s have cab windows with curved tops; these became rectangular after April 1950. Early SW7s had louvered rooftop radiator openings; in mid-1950 this changed to a wire-covered opening. The TR4 is a cow/calf version of the SW7.

SW7 major owners: ACL, CNJ, C&O, C&E, C&IW, CB&Q, CRR, DT&I, Erie, GN, IC, IHB, KCS, LV, L&N, MEC, MP, NC&StL, NYC, NKP, NP, PRR, SSW, SLSF, SOU, T&P, UP, WAB

TR4: AT&SF 2418, 2419; BRC 502-506; C&O 6000, 6001; MILW 2001-2006

SW8, TR6



Rock Island No. 817 is an SW8, with a single stack and eight louvered doors on the hood. *EMD*

An eight-cylinder 567 engine bumped the SW8's horsepower to 800 from the 600 of the SW1. The locomotive shared the same body as the later SW600 and SW900, but had six battery-box louvers behind the cab (as did some early units of the later models). The TR6 is a cow/calf version of the SW8.

SW8 major buyers: ACL, B&M, CN, CP, CStPM&O, CRI&P, C&W, DL&W, GN, LV, NYC, NKP, SP, T&P, US Army, WAB
TR6: SP 4600-4603; OM 1207-1213, 1216

SW9, TR5



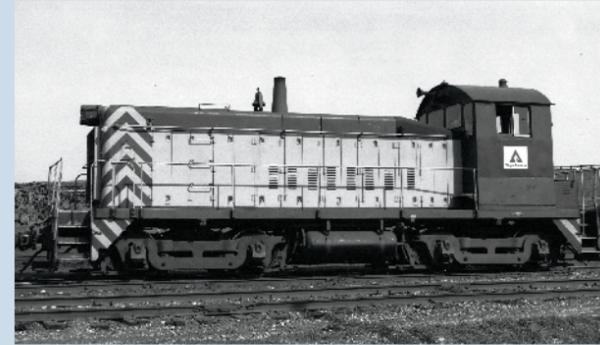
The SW9 has two exhaust stacks and eight louvered hood doors, but lacks the upper set of louvers found on the SW7. *EMD*

The SW9 was an upgraded version of the SW7. Both were rated at 1,200 hp, but the SW9 had the improved 12-cylinder 567B engine. Its appearance is similar to the SW7, but the SW9 lacks the upper set of louvers along the side. The SW9 also has a straight edge on the trim piece at the stairwell (the SW7's is curved), a fifth lift ring on each side, and new engine-door latches of the same style as the GP7. The TR5 is a cow/calf version of the SW9.

SW9 major buyers: AN, AT&SF, ACL, B&O, B&M, CN, CG, CNJ, C&O, C&NW, CRI&P, DL&W, DM&IR, Erie, FEC, GTW, HB&T, IC, LV, L&N, MP, MKT, NYC, NKP, PRR, Soo, SLSF, TRRA, T&P, UP, URR, WAB

TR5: UP 1870-1877; Union 701, 702, 703C, 704C (C units are extra calves)

SW600, SW900



Weyerhaeuser No. 1 is an SW600. It has five slits on the battery-box louver behind the cab—but early models had six slits, like the SW8. *Stan Mailer*

The 600-hp SW600 and 900-hp SW900 shared the same body, but had six- and eight-cylinder 567C engines, respectively. Features include a single exhaust stack and tall front grille. Early bodies were identical to the SW8; later bodies had battery-box louvers with five slits instead of six. Few SW600s were built, mostly for industrial users, as train sizes were growing and common-carrier railroads were looking for more powerful switching locomotives.

SW600: C&NW and 13 industrial owners

SW900 major buyers: AT&SF, B&O, BS, CN, CP, C&NW, CRI&P, GTW, LV, NYC, RR, RDG

SW1000



The SW1000 introduced a new cab design and higher-level running boards. *EMD*

When EMD introduced the 645 engine, the 1,000-hp SW1000 became the company's low-horsepower switcher, using an eight-cylinder version of the engine. The 645 required a taller hood than the 567 (and the hood was a foot narrower as well), changing the appearance significantly. The running boards were located noticeably higher than on earlier switchers, and the locomotive had a taller cab with a shallower roof radius. Options included standard AAR type A switcher trucks or Flexicoil trucks, which allowed higher speed for road use.

SW1000: BS, CB&Q, D&RGW, D&NE, HB&T, several industrial owners

SW1001



The SW1001 has lower running boards than the SW1000, but retains the taller hood. *EJ&E No. 445 rides on AAR type A trucks. Tom Healey*

The SW1001 was built at the request of industrial users who wanted a lower-profile switcher for clearance reasons. The SW1001 is internally the same as the SW1000, but had a shorter cab, low-level running boards, a cab profile like the SW1200, and two side cab windows (the SW1000 has four). The hood is still tall. Options included AAR type A or Flexicoil trucks.

SW1001: BS, EJ&E, GW, G&W, KCS, LIRR, RDG, several industrial users

SW1200



Rock Island SW1200 No. 930 rides on Flexicoil trucks instead of the standard AAR type A trucks. *EMD*

The SW1200 was almost identical to the earlier 1,200-hp SW9, but had an upgraded 567C engine. About the only way to differentiate an SW1200 is by the five louvers in its battery box (behind the cab). The SW9 has six louvers, but so do SW1200s built until March 1955. Some SW1200s rode on Flexicoil trucks. These locomotives had notches cut in the frame at the corner steps to clear the trucks.

Major buyers: AT&SF, B&O, BRC, CN, CP, C&IM, C&NW, CB&Q, CRI&P, DL&W, D&RGW, EJ&E, FEC, GTW, GN, IT, KCT, L&N, MILW, MN&S, MP, MKT, NYNH&H, NP, P&BR, PRR, RDG, RF&P, SSW, Soo, SP, TRRA, WAB

Denver & Rio Grande Western

1941-1988

The Denver & Rio Grande Western began dieselizing with switchers and EMD FTs during World War II, but wasn't fully dieselized until 1956. The Rio Grande purchased Southern Pacific in 1988, but the new railroad retained the Southern Pacific name. The D&RGW initially retained much of its identity, and received its last diesel order (GP60s that were originally part of an SP order) in 1990.



Number 5305 is one of 10 SD9s purchased by Rio Grande in 1957. *EMD*

Original road numbers	Second numbers	Qty.	Model	Builder	Dates built	Notes
38-43		6	44-tonner	GE	1941-42	
50		1	30-ton	Davenport	1937	1
66-74		9	VO660	Baldwin	1941	
100		1	NW2	EMC	1941	
101-119		19	S-2	Alco	1943-44	
120-123		4	H-10-44	F-M	1948	
130-139		10	SW1200	EMD	1964-65	
140-149		10	SW1000	EMD	1966, 1968	
150-152		3	H-15-44	F-M	1948	
540A-551A, 540D-551D	5401..5514	24	FTA	EMD	1942-44	2
540B-551B, 540C-551C	5402..5513	24	FTB	EMD	1942-44	2
552A-554A, 552D-554D	5521..5544	6	F3A	EMD	1946	2
552B-554B, 552C-554C	5522..5543	6	F3B	EMD	1946	2
555A-564A, 555D-564A, 5651..5764	5551..5644	44	F7A	EMD	1949-52	2
555B-564B, 555C-564C, 5652..5753	5552..5643	42	F7B	EMD	1949-52	2
5762, 5763, 5772, 5773		4	F9B	EMD	1955	
5771, 5774		2	F9A	EMD	1955	
3001-3028		28	GP30	EMD	1962-63	
3029-3050		22	GP35	EMD	1964-65	
3051-3093		43	GP40	EMD	1966-71	
3094-3130		37	GP40-2	EMD	1972-83	
3131-3153		23	GP40	EMD	1968	3
3154-3156		3	GP60	EMD	1990	

Original road numbers	Second numbers	Qty.	Model	Builder	Dates built	Notes
4001-4003		3	ML-4000	Kraus-Maffei	1961	4
5100-5113		14	GP7	EMD	1950-52	5
5200-5204		5	RS-3	Alco	1951	
5300-5304		5	SD7	EMD	1953	
5305-5314		10	SD9	EMD	1957	
5315-5340		26	SD45	EMD	1967-68	
5341-5413		73	SD40T-2	EMD	1974-80	
5501-5517		17	SD50	EMD	1984	
5901..5954		24	GP9	EMD	1955-56	6
6001, 6003, 6011, 6013		4	PA-1	Alco	1947	
6002, 6012		2	PB-1	Alco	1947	

Notes:

- 1—Ex-Sumpter Valley 101, acquired 1963 (3-foot gauge).
- 2—When F units (564 and below) were renumbered in 1950, a fourth digit replaced the original letter suffix: 1 for A, 2 for B, 3 for C, and 4 for D (thus 540A became 5401, 544C became 5443, etc.). F units delivered after that were numbered in the same pattern.
- 3—Ex-Conrail (nee Penn Central) 3113..3169, acquired 1984.
- 4—Diesel-hydraulic locomotives; sold to Southern Pacific in 1964.
- 5—No. 5100 was originally first 5104; renumbered in 1951.
- 6—GP9s were numbered in a similar pattern as F units: 5901, 5902, 5903, 5904, 5911, 5912, etc., to 5954.

Published rosters:

Diesel Locomotive Rosters (Wayner Publications), Extra 2200 South, October-November 1970

Detroit & Toledo Shore Line

1950-1981

The Detroit & Toledo Shore Line dieselized with a fleet of 10 EMD GP7s and six EMD switchers from 1950-1953, and they remained the railroad's standard power until the line was merged by Grand Trunk Western in 1981.

Road numbers	Qty.	Model	Builder	Dates built	Notes
41-50	10	GP7	EMD	1951-53	
116-118	3	SW7	EMD	1950	
119-121	3	SW9	EMD	1951-52	

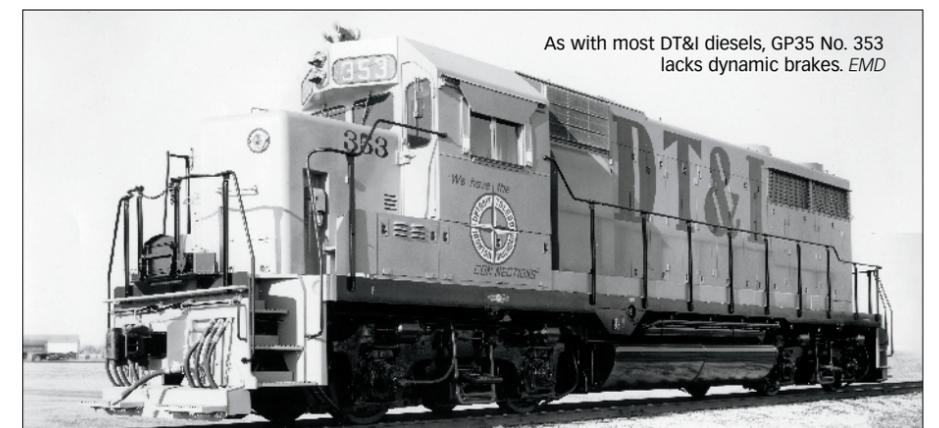
Published roster:

Diesel Locomotive Rosters (Wayner Publications)

Detroit, Toledo & Ironton

1941-1980

The Detroit, Toledo & Ironton began buying diesel switchers in 1941 and road units—EMD GP7s—in 1951, gradually adding more Geeps until dieselization was complete in 1955. The railroad owned EMD diesels exclusively until it was sold to the Grand Trunk Western in 1980.



Original road numbers	Second numbers	Qty.	Model	Builder	Dates built	Notes
200-206		7	GP38	EMD	1966, 1969	1
210-214		5	GP38AC	EMD	1970	
215-217 (1)	209, 208, 207	3	GP38AC	EMD	1970	
215-217 (2)		3	GP38AC	EMD	1971	
218-220		3	GP38	EMD	1971	