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Introduction



Brand-new Electro-Motive Division demonstrator GP35 No. 5652 undergoes testing with EMD's dynamometer car in 1963.

There has never been a better time to be a model railroader than right now. The wide availability of sharp-looking, smooth-running diesel models—many of which come factory-equipped with Digital Command Control (DCC) decoders and sound—makes it easy to model any era from the steam-to-diesel transition era to the present.

It wasn't that long ago that modelers had to settle for many compromises on models, including wide hoods (to accommodate bulky motors), unprototypically heavy handrails and stanchions, molded-on grab irons, and limited details. Into the 1990s, to get a highly detailed locomotive meant buying a model, adding several packets of detail parts, painting it, and lettering it with decals.

Today's models have a high level of realistic details, including separate grab irons, air hoses, uncoupling levers, windshield wipers, antenna, sunshades, and lift rings, to mention just a few. Handrails and other thin-profile parts are realistically scaled, window glazing is flush fitting, and many models include cab interior detail and figures and realistic lighting (including ditch lights, warning lights, and dimmable headlights).

Many locomotive models come in different versions to match specific prototype railroads or production phases, with varying details such as headlight style and placement, pilots, truck sideframes, fuel tanks, horns, and even body styles. In addition, the paint schemes available match specific real paint jobs, including paint and lettering variations on schemes and multiple road numbers.

Even though many of these models are produced in limited runs, the emergence of on-line stores and auction services such as eBay means that if a model has been produced, it's available for sale somewhere.

This evolution of models has had a dramatic impact the hobby, in that fewer modelers are taking the time to superdetail, kitbash, paint, and detail diesel models. Detailing diesels can still be a rewarding part of the hobby, as even with the wide selection of beautiful models, there are many opportunities for improving them with a little time and effort, as I explained in *The Model Railroader's Guide to Detailing Diesels*.

Even with all of these great models available, it's essential to know a bit about real locomotives in order to achieve a realistic model railroad. Understanding how the diesel locomo-

tive came to be, how diesel-electrics work, and how they have evolved will help you match the appropriate locomotives with the era and railroad you model.

This book is designed to be a modelers guide to real diesel locomotives, with information on the history, spotting features and differences, and characteristics of diesel locomotives. Handy charts show the years that each prototype locomotive was built, with a guide to the service life of each model.

The book will also be of interest to railfans who want to know about diesel locomotive history, differences, and operations. Included are listings of most prototype locomotives produced, including the years (and number) built and in service and their basic spotting features.

Most diesel locomotives were in production for several years—not like automobiles, where every year sees a new model or a significant revision to an existing model. Locomotive builders generally introduce new models for significant changes, such as a new engine or boost in horsepower. Details often change during each locomotive's production run. These can be large or small and reflect changes to upgrade performance, or replace troublesome components. Examples include changes in grille and louver location, handrail style, and window style or location.

Other spotting features involve optional components. These usually vary by railroad preference, and can encompass multiple options offered by a builder. Examples include fuel tank size; horn, bell, and headlight location and type; truck type; installation of dynamic brakes and/or steam generator; and high or low nose (for hood units).

Locomotive designation models sometimes make sense, following the horsepower and number of axles, but often they don't—especially for EMD, long the dominant locomotive builder. Each section includes a brief explanation of each builder's nomenclature.

What's in this book

It would be impossible to include in a volume of this size a record of every

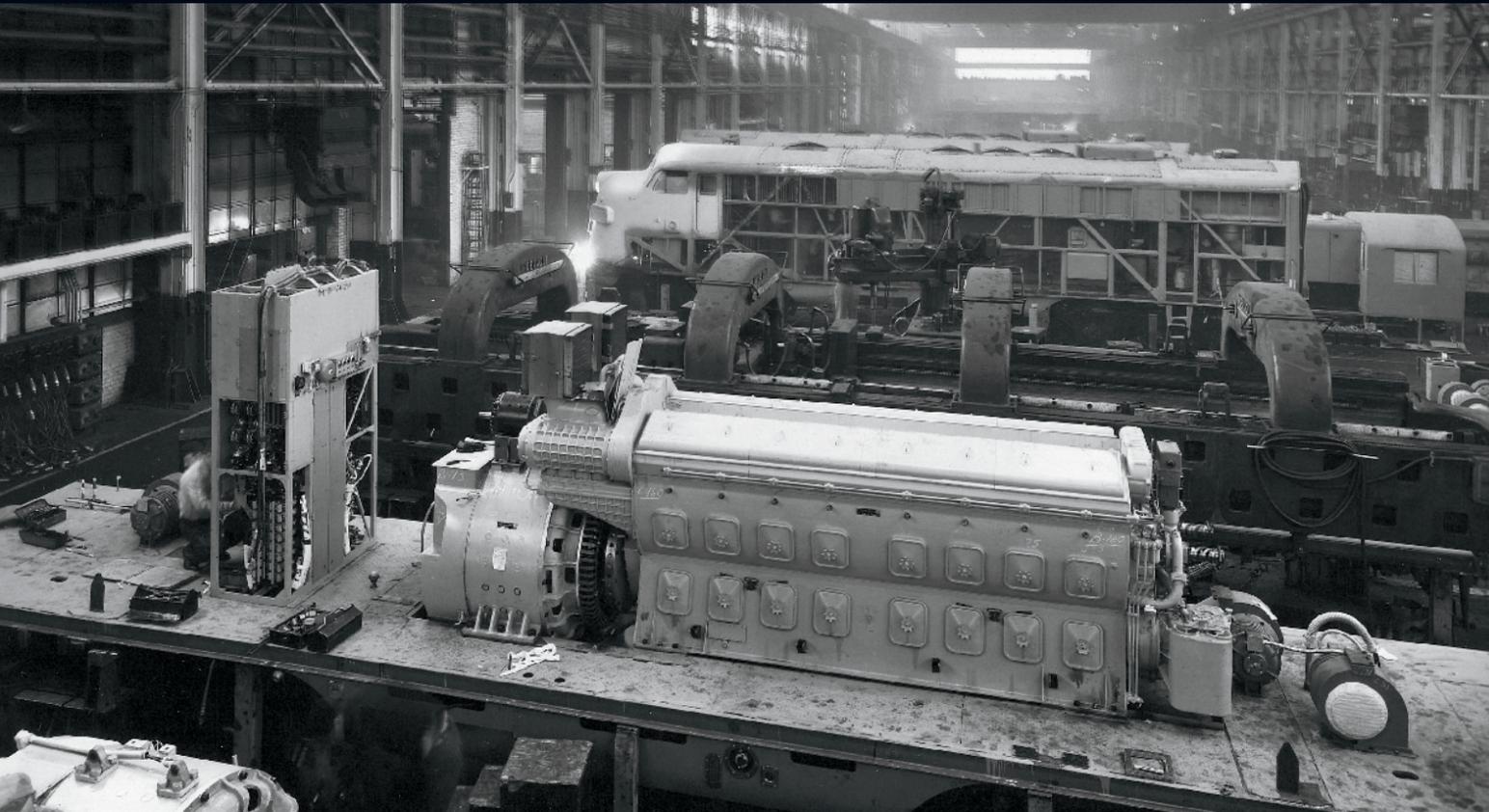
diesel locomotive produced. This book sticks to standard-gauge production diesel-electric models built for North American use by the major U.S. manufacturers—EMD, Alco, GE, Baldwin, Fairbanks-Morse, and Lima—and their Canadian subsidiaries. It does not include small industrial switchers (from either minor or major builders) or locomotives built strictly for export outside of North America. Many experimental locomotives are not included, unless they also served as demonstrators for production locomotives. Rebuilt locomotives, diesel-hydraulics, gas-turbines, gas-electrics, and genset locomotives are also not covered.

Summaries for each locomotive type list the major buyers for that model. If space allows, all initial buyers are included; some include initial road numbers. These lists do not include subsequent owners (through mergers or resales) or locomotive renumberings. Railroads are listed within these lists by their common initials or reporting marks. A full reference list of these can be found on page 86.

Tables in each chapter, grouped by locomotive manufacturer, provide the total number built for each locomotive type, timelines of the period each locomotive was produced (black lines), with years of common service (dark gray) and years when some were still in service (progressively lighter gray). This is to give modelers a handy reference for selecting models of locomotives appropriate for any given year. Consider this as a general guide, as with the thousands of locomotives built, it's impossible to verify the exact dates that all samples of a certain model were withdrawn from service. Also keep in mind that a locomotive that's extensively rebuilt may be given a new classification by its owner or rebuilder, and may not retain its original appearance.

Pages 84 and 85 include a reference to HO and N scale diesel locomotive models. It is not an inclusive list of all models ever offered; rather, it shows the latest and best models of each locomotive type. Although some may not be in current production, most can be tracked down through hobby shops, eBay, swap meets, or other sources.

How diesel locomotives work



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 in place on an F7 frame, as an FP7 takes shape in the background. *EMD*

TWO

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, but having a basic knowledge of how diesels work will help you understand why diesel locomotives are designed the way they are, what their limitations are, and what the differences are among the various models.

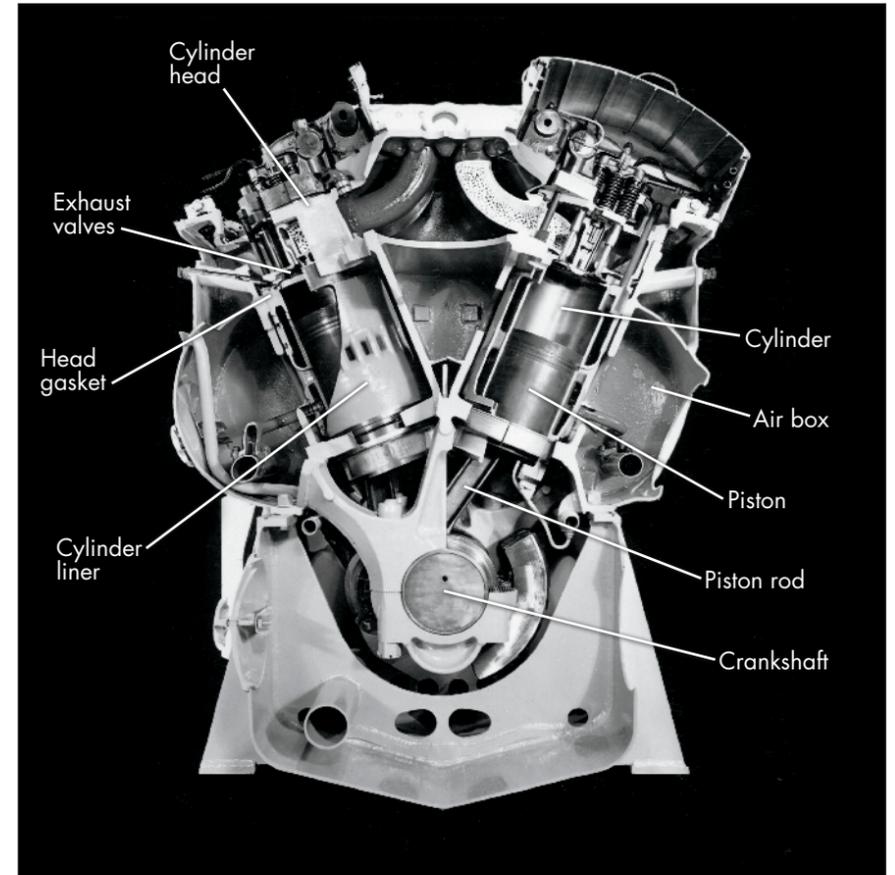
The diesel engine

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 a pressure of 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 page 14). 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 sticking point 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



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

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 McIntosh & Seymour engines in early Alco-GE-Ingersoll-Rand box-cab switchers of the 1920s and Alco locomotives of the 1930s; the Winton 201 engine of the early 1930s, used by Electro-Motive; Baldwin's DeLaVerne engine; and the Fairbanks-Morse opposed-piston diesel.

Electro-Motive chose the two-cycle Winton 201, introduced in 1932, to power its early passenger diesels and switchers, and designed a more-advanced, more-powerful two-cycle engine, the 567, to power its FT freight locomotive in 1939. The other diesel builders stuck with four-cycle designs to power their locomotives.

Most engines used in diesel locomotives are V-style, with paired banks of

cylinders at a 45-degree angle. Some early (and some smaller) engines used a straight (in-line) design, with all cylinders in a straight line over the crankshaft. Baldwin's VO and 600 engines and Alco's 539 are examples.

Fairbanks-Morse locomotives were noted for that company's unique opposed-piston (OP) two-cycle diesel engines. In an OP engine, two pistons share a common vertical cylinder, so there's no cylinder head. Each bank of cylinders (one on top, one bottom), drives a crankshaft.

In theory the opposed-piston design offers several advantages: increased efficiency, more power for a given engine size, and no cylinder head to maintain. However, maintenance headaches—chiefly the need to remove the upper crankshaft when doing any cylinder or piston maintenance—along with the engines' increased cooling needs and their high requirements for air, which could be problematic at high altitudes, offset these advantages. These engines

Switchers



SC, SW



Boston & Maine SC No. 1103 has a cast frame. The pair of offset stacks and short hood with sandbox in front indicate a 600-hp engine. EMD

Electro-Motive's first mass-produced diesels were the 600-hp SC and SW, built from May 1936 through January 1939. Both were powered by the eight-cylinder Winton 201A engine. They can be identified by the three screened openings at the top of each side (found on all Winton-engine switchers), the large sandbox in front of the hood, and two stacks offset to the left side (because of the in-line engine). The frame on the SC has lip where it overlaps the trim at the corner step; on the SW this seam is flush.

SC: AT&SF, B&M, Canton, CGW, CNJ, M&StL, MP, NYC, P&BR, PB&NE
SW: B&OCT, BCK, C&NW, C&EI, CB&Q, CRI&P, CV, EJ&E, LV, M&StL, P&BR, PB&NE, PRR, RDG

NC, (NC1, NC2), NW, (NW1, NW1A)



Soo Line NW1A No. 2100 shows the features of 900-hp switchers: a longer hood, no sandbox in front of the hood, and stacks centered instead of offset. It has a welded frame. EMD

The NC and NW were the 900-hp ("N") companions of the SC and SW, the difference being the cast or welded frames. These engines used the 12-cylinder 201A engine, which required a longer hood than the SC and SW. The N engines had exhaust stacks centered on the hood (because of the V-style engine). Externally, the locomotives are identical other than the frames, with the designation numbers indicating electrical equipment supplier differences.

NC: GN 5101; NC1: BS 71-75; NC2: MP 4100, 4101
NW: AT&SF 2350-2352; KCT 60, 61; NP 100; PB&NE 210, 211
NW1: C&NW 901; CB&Q 9200, 9201; CRI&P 700-707; EJ&E 400, 401; GN 5102; LV 120-130; M&StL D538, D738; Soo 2100-2102 (NW1A)

THREE

Electro-Motive's first two switchers, Delaware, Lackawanna & Western Nos. 425 and 426, were built at General Electric's Erie, Pa., plant prior to the opening of EMC's own assembly plant in LaGrange, Ill. The pioneering locomotives, built in early 1935, have distinctive cab, hood, and truck designs that wouldn't be repeated on later EMC or EMD switchers. EMD

Diesel-electric switching locomotives began appearing in large numbers in the mid-1930s. Even the most ardent steam supporters acknowledged that diesels were well-suited for yard, terminal, transfer, and other switching duties that required low speeds and high tractive effort. Diesels could run constantly, with no breaks needed for water, coal, or dumping ashes—just periodic refueling. Smoke ordinances in effect in many cities also hastened the arrival of diesels.

EMD Switchers

Model	HP	Wheel arrangement	No. Built	1935	1940	1950	1960	1970	1980	1990	2000	2009
SC	600	B-B	38									
SW	600	B-B	82									
NC	900	B-B	12									
NW	900	B-B	38									
SW1	600	B-B	661									
NW2	1,000	B-B	1,141									
TR	2,000	(2) B-B	3									
TR1	2,700	(2) B-B	2									
TR2	2,000	(2) B-B	36									
TR3	3,000	(3) B-B	2									
SW7	1,200	B-B	491									
TR4	2,400	(2) B-B	15									
SW8	800	B-B	301									
TR6	1,600	(2) B-B	12									
SW9	1,200	B-B	808									
TR5	2,400	(2) B-B	12									
SW600	600	B-B	16									
SW900	900	B-B	357									
SW1200	1,200	B-B	1,024									
SW1000	1,000	B-B	121									
SW1001	1,000	B-B	174									
SW1500	1,500	B-B	807									
SW1504	1,500	B-B	60									
MP15DC	1,500	B-B	351									
MP15AC	1,500	B-B	255									
MP15T	1,500	B-B	43									