

**Editor** David Lassen  
**Design Director** Thomas G. Danneman  
**Production Editor** Angela Pusztai-Pasternak  
**Trains Magazine Editor** Jim Wrinn  
**Senior Associate Editor** Brian Schmidt  
**Digital Editor** Steve Sweeney  
**Assistant Design Director** Scott M. Krall  
**Illustrators** Roen Kelly, Kellie Jaeger  
**Production Specialist** Sue Hollinger-Klahn  
**Librarian** Thomas Hoffmann

**TRAINS.COM**

**Executive Producer** A. David Popp  
**Producer** Kent Johnson

**CUSTOMER SERVICE**

phone: (877) 246-4843  
Outside the U.S. and Canada: (903) 636-1125  
Customer Service:  
customerservice@TrainsMagazine.info

**ADVERTISING SALES**

**Advertising Sales**  
phone: 630-248-2299  
email: tvorel@kalmbach.com

**EDITORIAL**

phone: (262) 796-8776  
email: editor@trainsmag.com  
P.O. Box 1612  
Waukesha, WI 53187-1612

**Founder** A.C. Kalmbach, 1910-1981

**SELLING TRAINS MAGAZINE OR PRODUCTS IN YOUR STORE:**

phone: 800-558-1544  
Outside U.S. and Canada: 262-796-8776, ext. 818  
email: tss@kalmbach.com  
website: Retailers.Kalmbach.com

**VISIT OUR WEBSITE**

Trains.com

**KALMBACH MEDIA**

**Chief Executive Officer** Dan Hickey  
**Senior Vice President, Finance** Christine Metcalf  
**Senior Vice President, Consumer Marketing**  
Nicole McGuire  
**Vice President, Content** Stephen C. George  
**Vice President, Operations** Brian J. Schmidt  
**Vice President, Human Resources** Sarah A. Horner  
**Advertising Sales Director** Scott Redmond  
**Circulation Director** Liz Runyon  
**Director of Digital Strategy** Angela Cotey  
**Director of Design & Production** Michael Soliday  
**Retention Manager** Kathy Steele  
**Single-Copy Specialist** Kim Redmond  
**Account Executive** Tom Vorel

EMD at 100 (ISBN 978-1-62700-8952) is published by Kalmbach Media Co., 21027 Crossroads Circle, P.O. Box 1612, Waukesha, WI 53187-1612. Canada publication mail agreement 40010760.

Single copy prices: \$9.95 in U.S.; \$10.99 in Canada and other foreign countries, payable in U.S. funds drawn on a U.S. bank. Canadian price includes GST. BN 12271 3209 RT. Printed in the U.S.A.

©2021 Kalmbach Media Co. All rights reserved. Any publication, reproduction, or use without express permission in writing of any text, illustration, or photographic content in any manner is prohibited except for inclusion of brief quotations when credit is given.

**On the cover: EMD SD70ACe No. 1201, painted yellow to honor parent company Caterpillar, leads eastbound Norfolk Southern train 055 at West Waddy, Ky., on Oct. 26, 2012. E.M. Bell**



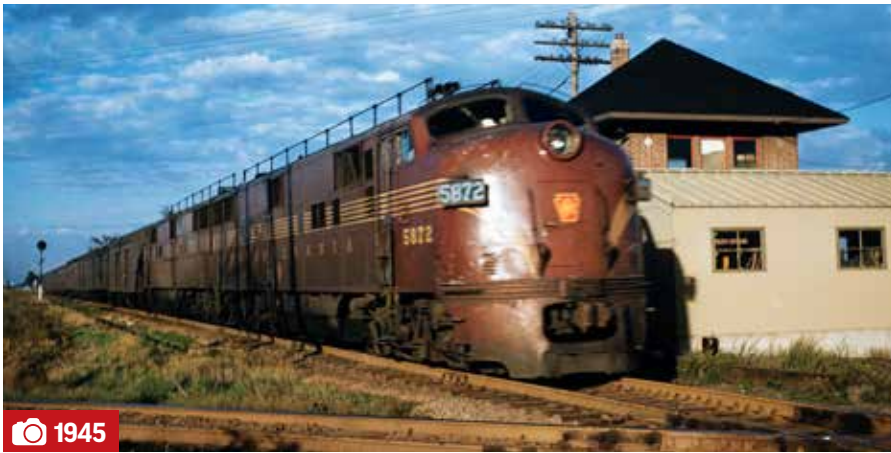
**Trains** SPECIAL

# EMD AT 100



EMD SD70ACe No. 1201 prepares to depart Norfolk Southern's Good Yard in Normal, Ill., with a train of Caterpillar export products bound for Savannah, Ga., on Oct. 24, 2012. Steve Smedley

- 4 EDITOR'S NOTE**  
The company that did it
- 6 THE LA GRANGE INFLUENCE**  
What if ground had not been broken on March 27, 1935? *David P. Morgan*
- 10 THE EMD EPOCH**  
A century of diesel progress *Robert S. McGonigal and Greg McDonnell*
- 18 ELECTRO-MOTIVE: YOUNG GIANT**  
Pioneering infant is now world's largest builder *David P. Morgan*
- 28 F IS FOR FREIGHT**  
The breakthrough streamliner for heavy hauls *Wallace W. Abbey*
- 36 NO CAB, NO PROBLEM**  
The B unit earned its place in EMD's product line *Chris Guss*
- 44 HOW THE 'HOME OF THE DIESEL LOCOMOTIVE' BUILDS DIESELS**  
EMD has little in common with Boeing or Buick *Jerry A. Pinkepank*
- 54 AMERICAN STANDARD**  
The SD40 and family became the all-time best-selling diesel *Greg McDonnell*
- 64 PROVING (AND IMPROVING) THE PRODUCT**  
Demonstrators and test beds that paved the way for key advances *David Lustig*
- 72 EMD'S NEXT ERA**  
Technology brings change in locomotive building *Dan Zukowski*
- 80 ENGINEERS ON EMD**  
Hoggers swap stories about the diesels of La Grange *Various authors*



📷 1945

**1948-54: TRIPLE THREAT** Flooded with orders, EMD operates Plant 3 in Cleveland to produce switchers and road-switchers. Plant 2 on Chicago's South Side made parts and did subassembly work before closing in the late 1980s.

📷 **1949: KING OF THE CABS, AND FIRST OF THE NEW ORDER**

Refinements to the F3 produce the F7, whose sales of 4,221 units (including FP7 cousins) in just five years make it the best-seller of all the Fs, and send the steam locomotive reeling. The same year (after an uncharacteristic stumble with the BL2), EMD unveils its version of another concept — the road-switcher. The 1,500-hp unit's "GP7" designation reflects its marketing as a general-purpose machine. The first Geep, Chicago & North Western GP7 No. 1518, reposes at an EMD open house in 1972. J. David Ingles, Brian Schmidt collection

**1950: DIESELS FOR THE DOMINION**

General Motors Diesel Division (GMD) opens a new plant in London, Ontario, to build for the Canadian domestic market.



📷 1949

**1951: MILESTONE** EMD produces its 10,000th unit — Wabash E8 No. 1009, an example of the 2,250-hp locomotive that helped finish off steam power on premier passenger trains.

**1952: SPECIAL DUTY** SD7 demonstrators tour the U.S., kicking off the six-motor Special Duty series that would become popular in the mid-1960s.

**1953: BABY BOOM IN DIESELS** Chicago's Plant 2 churns out F and Geep cabs for final assembly at La Grange, the "Home of the Diesel Locomotive." The railroads are pushing hard to dieselize, and EMD has better than 75% of a market that, at its peak, sustained four major builders.

📷 **1955: LAST DOMINO** Norfolk & Western, the last great bastion of steam power (it built its own as late as 1953), orders four GP9s. Within five years, N&W is fully dieselized, its roster two-thirds EMD. Two Geeps handle a train near Portsmouth, Ohio, in 1962. John S. Ingles, Brian Schmidt collection



📷 1955



📷 1958-59

**1956: BUCK ROGERS REDUX** In an echo of the 1930s, lightweight trains seem the answer to highway competition, so EMD fields the Aerotrain, a 1,200-hp, three-axle locomotive with jet-age styling pulling cars based on GM bus bodies.

📷 **1958-59: MORE POWER** Prompted by work done by Union Pacific, EMD introduces turbocharging — the use of engine exhaust gases to force additional air into the cylinders during each power stroke, boosting engine power by 33% or more — in the SD24 (shown) and GP20. Brian Schmidt collection

**1959: SUNSET FOR THE "PURE" GEEP** The last GP9 is built (but for a final 10 from GMD in 1963): at 4,257 units, the GP9 is the best-selling Electro-Motive design to date. Also in 1959, EMD builds its first low-nose units for road service (though Phelps Dodge got long-hood-forward GP9s in 1955 with low short hoods for better viewing of the train behind).

📷 **1960: F-UNIT FINALE** New Haven 2059, last of the road's unique dual-power (diesel-electric/third-rail-electric) FL9 fleet, is delivered, bringing down the curtain on F-unit production. Sister 2043 is pictured at Route 128 station in Massachusetts. Matthew Herson, Brian Schmidt collection

**1961: BIRTH OF A FAN FAVORITE** With "first-generation" diesels coming due for retirement and a horsepower race heating up among EMD, Alco, and newcomer GE, EMD introduces the 2,250-hp GP30,



📷 1964-65



📷 1960

whose distinctive rooftop cowling would make it popular among railfans.

**1962: ANOTHER MILESTONE** EMD builds its 25,000th locomotive — Louisville & Nashville GP30 No. 1014.

📷 **1963: NEW FACE - 1** The angled-roof “Spartan” cab is introduced on the 2,500-hp GP35. More than 14,000 low-nose/Spartan-cab locomotives would be produced over the next three decades.

J. David Ingles, Brian Schmidt collection

**1964: BYE-BYE, BULLDOG** Union Pacific E9 No. 914, the last of more than 5,600 E and F units built with EMD’s classic round-

ed nose, leaves La Grange. Functionalism has triumphed; streamlining is dead.

📷 **1964-65: BLACK MARIAS** Ten experimental units, in unassuming black, roam the nation testing the new 645 prime mover and A.C.-D.C. alternator-rectifier transmission system (straight D.C. had been standard). Flared-radiator SD40s 434E and 434F handle a Chesapeake & Ohio train at Toledo, Ohio, in 1965. James J. Genat

**1966: 645-A-GO-GO** EMD launches a whole new line of 645-engined locomotives, headed up by the SW1500, GP38, GP40, SD40, and the 20-cylinder, 3,600-hp, flared-radiator SD45. Dieseldom’s second generation is in full swing.

**1967: STRIPPED-DOWN STREAMLINING** For its top passenger trains, Santa Fe asks for something dressier than a simple hood unit. The full-width cowl on the FP45 (and F45 freighter) harks back to the contours of the Es and Fs, and offers protection during on-the-road troubleshooting in bad weather, making the cowl popular in Canada.

**1969: CENTENNIAL** A century after the Golden Spike, UP buys EMD’s biggest ever: the 16-wheel, twin-engine, 98-foot-long, 6,600-hp DDA40X. Though unique to UP, the 6900s presaged the Dash-2 line of locomotives and was North America’s first wide-nose hood unit.

📷 **1972: GETTING BETTER ALL THE TIME** The popular 1966 Line is improved thanks to a number of refinements, chief of which is a modular “plug-in” electrical control system. With Alco having bowed out in 1970, only two big builders remain: EMD and GE. The Dash-2 line enables EMD to continue to dominate the market. TRAINS collection

**1975-76: JUICE JACKS (FREIGHT)** The first U.S. “energy crisis” has some Class I railroads mulling electrification, so EMD and Swedish manufacturer ASEA team up on two freight units for tests on Penn Central. But within a few years, the “crisis” passed, Conrail forsook electric freight operations, and the GM6C and GM10B were orphaned.



📷 1963



📷 1972

# NO CAB



## The venerable B unit earned its place in the EMD product line

by Chris Guss

In the desert southwest, twin ribbons of steel lie across a barren landscape. The flickering lights of distant signals dance in the heat rising up from the rails. Far off a headlight appears, growing larger by the second. In no time, a hot Santa Fe intermodal train slams past at 70 mph. Its mile-long stretch of intermodal cars is led by a quartet of EMD 60-series four-axle diesels wearing Santa Fe's red-and-silver Super Fleet paint scheme.

This scene played out countless times in the 1990s on Santa Fe's Chicago-to-California main line, both in Santa Fe days and, later, the BNSF era. The train's locomotive consist was unique to contemporary railroading, set up in a perfect A-B-B-A consist with two GP60Ms on either end and a pair of cabless GP60Bs in the middle. The GP60B units represented the swan song of EMD's cabless locomotive production, ending more than a half-century of B units

used in almost every type of service in North America.

The cabless B unit has been around since almost the beginning of dieselization, with EMD taking the lead in its production. Whether it was for service on freight or passenger trains, on the road or in the yard, EMD had a cabless answer for any customer. Production of B units spanned from the first six-axle EB passenger locomotive in 1937 to those GP60Bs constructed for Santa Fe in 1991.

A B unit is simply a locomotive without a cab for a crew to occupy. While a cabless unit can have hostler controls — basic equipment to enable an employee to move the unit around in the yard — these controls are not designed for over-the-road service. Over the years, the vast majority of cabless units have been constructed new from the factory, although some were converted in-house by various railroads, sometimes following a wreck in which the cab was severely damaged.

When cabless units entered the North American market in the late 1930s, prime movers were generally in the 900-1,500 hp range for both passenger and freight models. To lure railroads to the new diesels, builders such as EMD had to create motive power consists to equal or surpass the performance of the largest steam locomotives. This led to the development of multiple-unit locomotives.

Dispensing with cabs on middle units had several advantages. Cabs and the equipment found inside them were expensive; eliminating them would save railroads money. Moreover, cabless units would address labor issues in which unions would

# NO PROBLEM



In the early 2000s, when six-axle power was firmly entrenched on mainline trains, BNSF Railway regularly dispatched its hot Chicago-to-Los Angeles intermodal train with solid four-axle power consists. On March 6, 2000, Z-WSPAC1-04 departs Willow Springs yard with a perfect A-B-B-B-A consist and is following the Chicago Sanitary and Ship Canal to Joliet. Chris Guss

# PROVING (AND



## EMD demonstrators and test beds that paved the way for key advances

by David Lustig

**P**roduct demonstrators and test beds have exactly one job in life — showing potential customers the wonders and delights of a new product.

Demonstrating a new locomotive is one thing, and proving its technology in a test bed can be another. Some, like the SD45X, are pure test beds. Others are demos and test beds; still others are strictly demos.

Sometimes they work well. Other times, not so much. With diesel locomotives, we

remember those that were the pioneers in entire new classes of diesels such as the GP7 or F3 and quickly forget those that failed, for one reason or another, to bring home the hoped-for mass orders. Few of us recall the early BL-series or the later second-generation GP15D and GP20D models — not to be confused with “normal” GP15s and GP20s — despite the company fielding demonstrators.

After consulting with knowledgeable industry engineers and drawing on insights gained over decades of experience, here is

an opinionated list of some of the most interesting EMD demonstrators and test beds to burnish the rails.

### FTA and B

The FT had an impact on the railroad industry akin to the Douglas DC3 and Boeing 707 in aviation.

The industry was generally moving toward the idea of regular diesel propulsion in mainline freight service — many passenger trains were already in Dr. Diesel’s

# IMPROVING) THE PRODUCT



**Restored FT demonstrator No. 103 keeps company with a Union Pacific DDA40X — which helped test components introduced on the SD40-2 — at an EMD open house in 1989. Just visible: SDP40F-turned-test-bed No. 268.** J. David Ingles; Brian Schmidt collection

competent hands — but the move to power freight trains away from the comfortable confines of yards and their attending facilities was still in its infancy.

A barnstorming quartet of two A units and two semipermanently coupled B units, powered by the newly designed 16-cylinder version of the 567 engine, hit the railroads in 1939. They were an instant success. By November 1945, almost 1,100 of the 1,350-hp units — 555 As and 541 Bs — rolled out of EMD's erecting halls. The initial and ultimately largest owner of FTs was Santa Fe,

which rostered 320 copies. It was eager to dieselize large portions of its system that operated through desert areas where water was so scarce that the railroad was forced to run solid tank to fill lineside facilities for thirsty steam locomotives.

Some railroads ordered their units semipermanently coupled with drawbars, while others wanted standard couplers to make it easy to mix and match as power requirements dictated. Santa Fe even regearred a small group of FTs and repainted them into red-and-silver passenger colors to power

varnish until F3s could be delivered.

FTs were easy to spot on ready tracks full of later-model F units. As built, they were equipped with four closely spaced portholes on their flanks; there was a fifth in the B unit if it had hostler controls. As they matured, many railroads replaced the portholes with later-model F-unit windows or simply plated them over. Dynamic-brake-equipped units had a boxy rectangular structure on their roofs.

Invaluable to the railroads that owned them during the war years, as newer models