Trains SPECIAL

TOP 10 MUST-SEE PRESERVED DIESELS p. 80

LOCOMOTIVE 2013

Annual 2013

20-page guide
to North America's major fleets p. 22

Inside look
at EMD's new diesel birthplace p. 42

The last resort
RS3s in the Pocono Mountains
p. 90

Revisiting Steinheimer's Cajon Pass p. 50

$9.95 • DISPLAY UNTIL NOVEMBER 23, 2013
38
7 25274 46788 4

Rj Corman RAILPOWER® Locomotives

SERVICE

Industry's **#1 customer service** backed by a strong network of RP techs and Deutz distributors

PERFORMANCE

Power Plus Traction System providing **33%** adhesion with individual axle control

EXPERIENCE

Over **40,000** engines in industrial and rail service with over **400** in Railpower Locomotives

FLEXIBILITY

Greatest choice of platform, equipment options, and software features with reduced down time enabled by trackside repairs

www.railpower.com **814-835-2212**

LOCOMOTIVE 2013

TRAINS MAGAZINE SPECIAL EDITION NO. 11-2013

Editor Greg McDonnell
Art Director Thomas G. Danneman
Associate Editors Jim Wrinn, Matt Van Hattem, Angela Pusztai-Pasternak, Steve Sweeney, Brian Schmidt
Editorial Assistant Diane Laska-Swanke
Senior Graphic Designer Scott Krall
Graphic Designer Drew Halverson
Lead Illustrator Rick Johnson
Librarian Thomas Hoffmann
Publisher Diane M. Bacha

Editorial
phone: (262) 796-8776
email: editor@trainsmag.com
fax: (262) 798-6468
P.O. Box 1612
Waukesha, WI 53187-1612

Advertising Sales
phone: (888) 558-1544, ext. 625
email: adsales@trainsmag.com
fax: (262) 796-0126

Customer Service
phone: (800) 533-6644
Outside the U.S. and Canada: (262) 796-8776, ext. 421
email: customerservice@kalmbach.com
fax: (262) 796-1615
Please include your name, mailing address, and telephone number with any correspondence

Retail trade orders and inquiries:
phone: 800-558-1544, press 3
Outside U.S. and Canada: 262-796-8776, ext. 818
fax: 262-798-6592
email: tss@kalmbach.com
website: www.Retailers.Kalmbach.com

Visit our website
www.TrainsMag.com/Locomotives

Please Recycle This Magazine

Kalmbach Publishing Co.
President Charles R. Croft
Vice President, Editorial Kevin P. Keefe
Vice president, Advertising Scott Stollberg
Vice president, Marketing Daniel R. Lance
Corporate Art Director Maureen M. Schimmel
Managing Art Director Michael Soliday
Corporate Circulation Director Michael Barbee
Group Circulation Manager Kathy Steele
Circulation Coordinator Maggie Sketch
Single Copy Sale Director Jerry Burstein
Advertising Sales Manager Mike Yuhas
Advertising Sales Representative Todd Schwartz
Ad Services Representative Christa Burbank
Production Supervisor Helene Tsigistras
Production Coordinator Sue Hollinger-Yustus

Founder
A.C. Kalmbach, 1910-1981

Locomotive (ISBN 978-0-89024-995-6) is published by Kalmbach Publishing 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.

Trains SPECIAL

KALMBACH PUBLISHING CO.

On the cover: Union Pacific ES44AC No. 7931. Tom Danneman
This page: Iowa Pacific E8A No. 518 and S&NC BL2 No. 52 approach Thurman, N.Y., on June 10, 2012. **See page 62.** Brian Plant

CATERPILLAR YELLOW

This year's hot new color.

Caterpillar Yellow.

Electro-Motive Diesel, as part of Caterpillar's Rail Division, is an industry leader in the design, manufacture and sale of diesel-electric locomotives and related products and services. In its 90-year history, EMD has produced over 62,000 locomotives for more than 75 countries worldwide. Caterpillar's Rail Division offers the widest range of solutions for all types of railway applications. **The original and built to last.**

Electro-Motive Diesel is owned by
Progress Rail Services, A Caterpillar Company

ELECTRO-MOTIVE

LOCOMOTIVE 2013

Contents

All in! BNSF Dash 9s lead an eastbound intermodal train into Winslow, Ariz., on a March 2013 evening. See page 22. Greg McDonnell

ENGINE HEATING

for the Rail Transport Industry

By equipping a locomotive with a HOTSTART block heater, the prime mover can be shut down and easily restarted, even after days sitting in freezing weather. This eliminates the problems with idling including wasted fuel and oil, wet-stacking, emissions, noise and engine wear.

Visit HOTSTART.com and select Railroad from our Markets tab to learn how you can drastically reduce fuel and maintenance costs with HOTSTART idle reduction technology.

www.hotstart.com

HOTSTART® ENGINE HEATING

LOCOMOTIVE 2013

>> On the Web

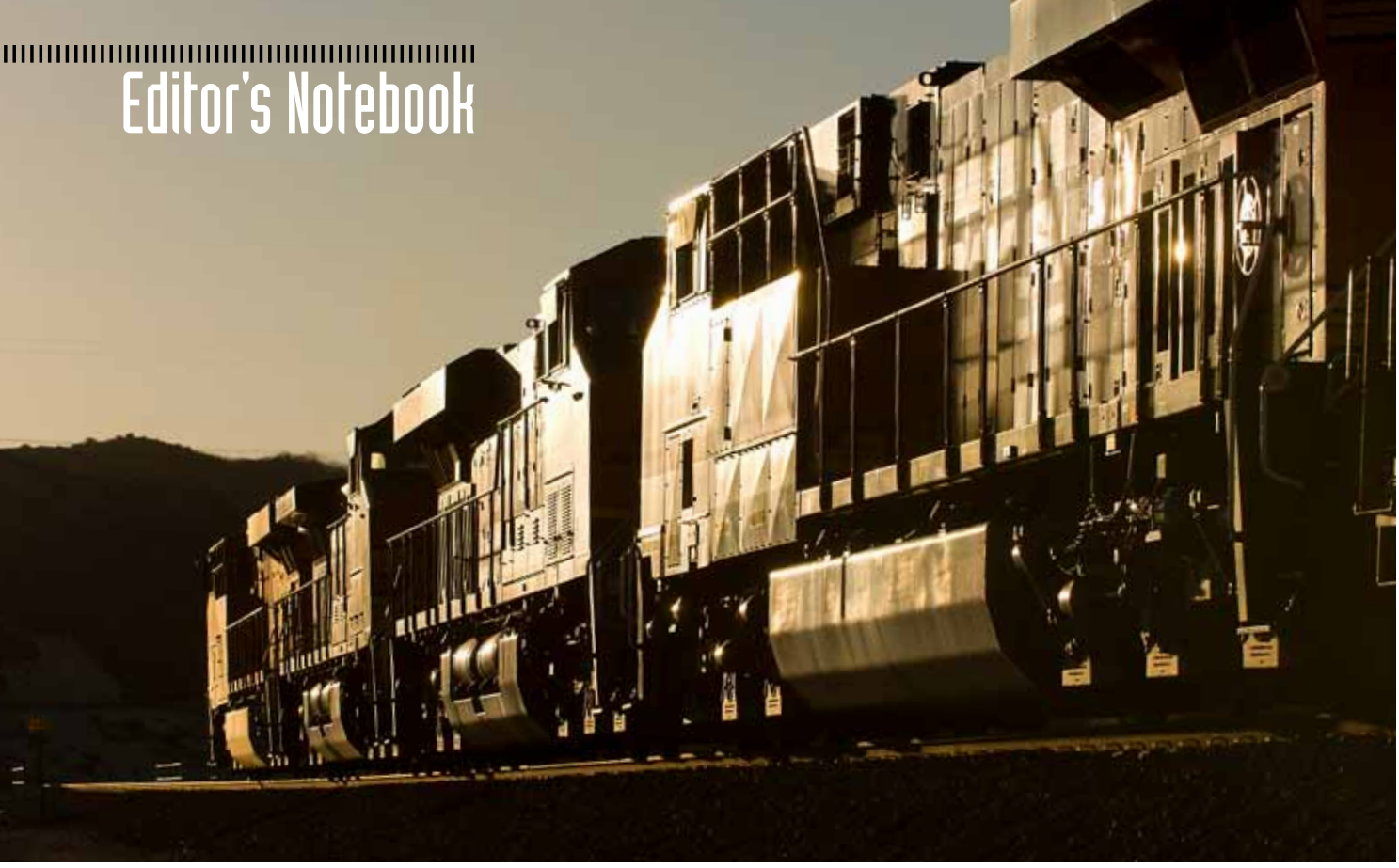
More Muncie
Check out photos of EMD locomotives under construction at Progress Rail's plant in Muncie, Ind.

Cajon Pass Revisited
Read Richard Steinheimer's September 1974 TRAINS masterwork "Cajon Pass Revisited."

From-the-cab video footage
Ride Delaware-Lackawanna RS3s upgrade out of Scranton, Pa.

Visit www.TrainsMag.com/Locomotives

Delaware-Lackawanna 4068, one of DL's four RS3 "girls of summer," rests at Scranton, Pa., on a May 2013 morning. See page 90. Greg McDonnell



Tapping into the most elemental attractions of railroading, a quartet of BNSF GEs climb Cajon at dawn. Greg McDonnell

Some things just don't change

When David Styffe and I set out to make the photographs to illustrate "Revisiting Steinheimer's Cajon Pass" on pages 50-61, we did so with 73 years of TRAINS magazine tradition at our backs, and the urge to honor one of the great masterpieces from the magazine's history: Richard Steinheimer's September 1974 feature "Cajon Pass Revisited." One of the most spectacular railroad stages on earth, Cajon has always loomed large in the pages of TRAINS. But never more so than in Stein's 1974 piece.

Stein rode shotgun on my first foray to Cajon more than 35 years ago. Well, spiritually, at least. The still-fresh September '74 TRAINS was on the passenger seat as I pointed my Datsun rental car up Cajon Boulevard on the outskirts of San Bernardino, Calif., on a misty March morning with Emmylou Harris and Gram Parsons on the tape deck, and a quartet of Union Pacific SD40-2s howling alongside. Cajon was everything Stein promised. And more.

With the Steinheimer story as my guide, I reveled in Cajon's rich history, and in quintets of blue-and-yellow Santa Fe GP30s and GP35s lugging manifests up the legendary mountain grade. I watched Southern Pacific GEs and Tunnel Motors rumble past train-order-office cabooses, and looked on in dismay as a pair of UP freights, each headed by Centennials bracketing U30Cs, thundered past my little red Datsun, temporarily mired in a flooded wash. I managed to extricate the car without incident, but I've been stuck on Cajon ever since.

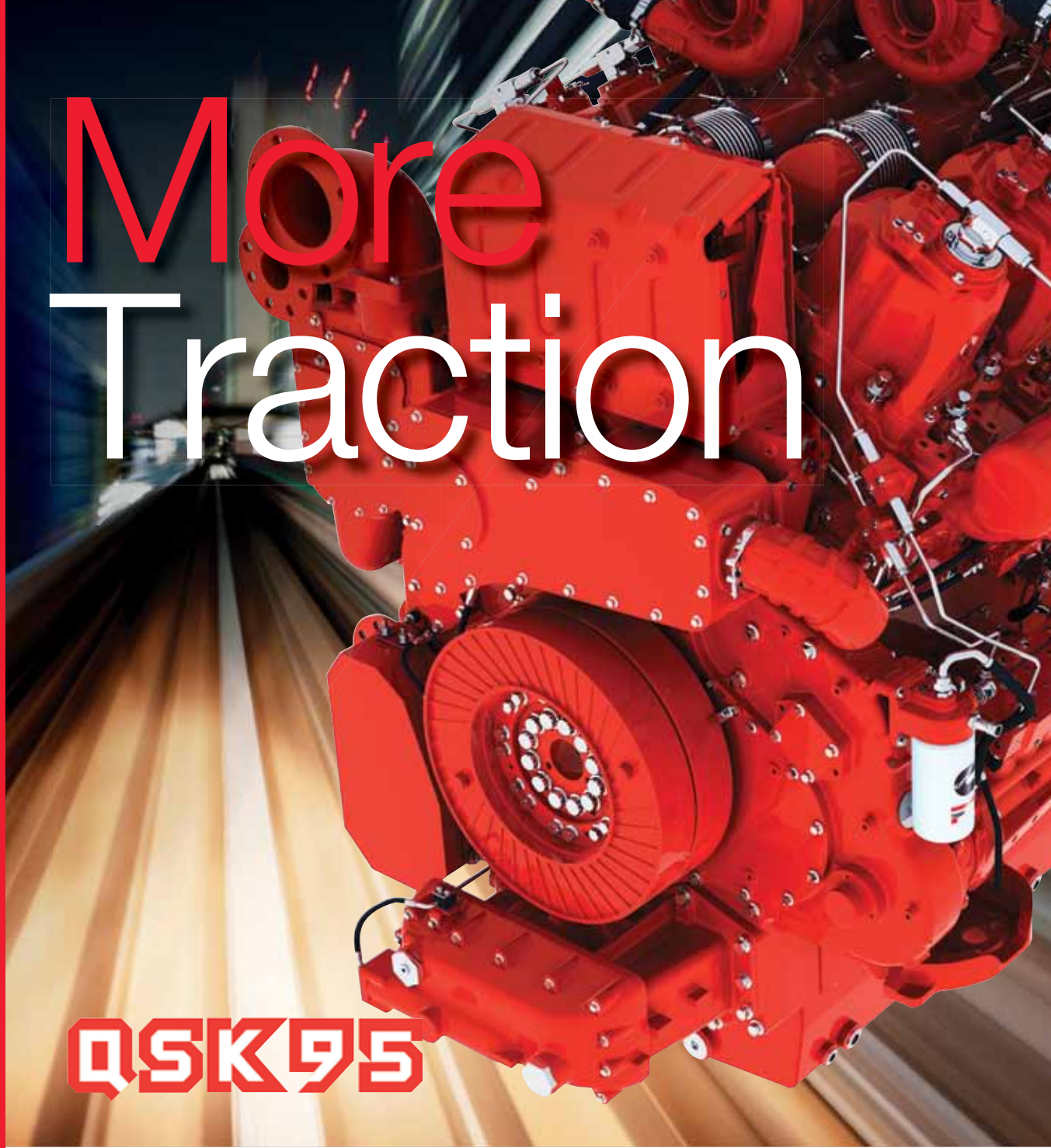
"Lucius said it first," wrote TRAINS editor David P. Morgan, introducing Stein's 1974 epic with a Lucius Beebe quote from the very first issue of the magazine: "To stand poised at just the right angle and the right hand side, to include the power reverse gear, with the sun over one's shoulder in the Cajon, listening to the thunder of the exhaust of the helper and road engine of the *Chief* half a mile below, and know one has it, cold turkey, is one of the great delights of the business of living."

Seventy-three years down the road, Styffe "had it cold turkey," as Beebe would say, capturing the essence of Cajon in a single frame, as a westbound BNSF intermodal and an eastbound UP freight simultaneously threaded the S-curves at Alray. We set out to celebrate contemporary Cajon in the spirit of Stein's essay, and Styffe's image, spread across pages 50-51, does just that.

"The *Chief*, its 4-8-2 helper and 4-8-4 road engine, and Beebe himself have gone," Morgan continued, "but the words linger on and still ring true in this age of SD45s, containers, and Amtrak." Four decades further on, Cajon is as captivating as ever. The magic of Cajon transcends the appeal of specific times and technologies — from Herb Sullivan's Atlantics and Warbonnet E1s, to Stein's SD45s and DD35s, to today's ACes and Dash 9s, and EVOs — and taps into the most elemental attractions of railroading, delivering still, some of "the great delights of this business of living."

If you're unconvinced — and better still, if you believe — take a drive up Cajon Boulevard. Some things just don't change.

Greg McDonnell, editor



QSK95 4200 hp V16 Locomotive Engine

Clean Power – Meets Tier 4 and EU Stage IIIB very low emissions
Extended Life – Advanced design for reliability and lowest total cost of ownership
Efficient Packaging – Engine and aftertreatment comfortably fit in today's locomotives
Fuel Savings – MCRS fuel system and SCR aftertreatment for optimized performance

Cummins Tier 4 – A Better Train of Thought.

Phone: 1-800-DIESELS (1-800-343-7357) Fax: 1-800-232-6393
Email: railengines@cummins.com Internet: cumminsengines.com

Cummins Inc.
Box 3005, Columbus, IN 47202-3005, U.S.A.

All in the family: Caterpillar-painted EMD SD70ACe No. 1201 heads a train of Caterpillar heavy equipment. Jim Wrinn

All in the family

A conversation with Progress Rail's CEO William P. Ainsworth

by Chris Guss

It's no small feat to unite three of the biggest players in the transportation and heavy equipment industries. Caterpillar subsidiary Progress Rail Services acquired Electro-Motive Diesel in a history-making transaction in August 2010, creating a technological, manufacturing, and supply-chain powerhouse. On the third anniversary of the union, we checked in with William P. Ainsworth, Caterpillar vice president, and president and CEO of Progress Rail Services and its subsidiaries including Electro-Motive Diesel. Here's what Ainsworth had to say about EMD's new F125 passenger model, its plan to meet Tier 4-emissions regulations, and integrating the resources of the three companies.

EMD's new F125 Spirit exemplifies the synergies and opportunities that come with being a part of the Caterpillar family, Ainsworth says. As an integrated manufacturer, Caterpillar provided EMD with a wide range of existing engines as potential power plants for the F125. EMD selected the most appropriate Caterpillar engine for a passenger locomotive application and brought the product to market quickly. "We leveraged Cat's engine and their great engine reliability and technology with EMD's locomotive reliabilities and passenger locomotive technologies," Ainsworth says, "and were able to come up with a great solution."

William P. Ainsworth

The first F125 customer, Los Angeles-area commuter hauler Metrolink, governed by the Southern California Regional Rail Authority, signed up for 17 of the new locomotives with an option for 13 more. While its debut performance will be as a commuter locomotive, the F125 "has the range, speed, horsepower, and head-end power capability to provide any type of passenger locomotive service in North America," Ainsworth says. Progress Rail in Muncie, Ind., will build the new Metrolink locomotives, and they're scheduled to begin testing in fall 2015.

EMD has not revealed its plans for the EPA Tier 4-emissions regulations, which take effect on Jan. 1, 2015. Ainsworth says the company has several Tier 4 engines being tested, and he's comfortable with the progress. While conducted at EMD facilities, Ainsworth says the program is a Caterpillar/EMD team effort.

Ainsworth says the company's Tier 4 solution will be an "enterprise" product, a result of the rich knowledge and experience of both Caterpillar and EMD. "Going forward," Ainsworth stresses, "we plan on having engines that meet our customers' requirements that are jointly developed." I

TECHNICALLY, WE DO IT ALL.

FROM START TO FINISH

- New Locomotive Design & Build
- Used Locomotive Sales
- Re-Powered Locomotives
- Genset Locomotives
- Leasing
- New Locomotive Parts
- Fabrication
- Electronics
- Wheel & Axle
- Engine Re-Manufacturing
- Inspections
- Field Services
- Paint & Design
- Engineering Services
- Wreck Repair
- Deck Overhaul
- Power Upgrades
- Cab & Comfort
- Consultation

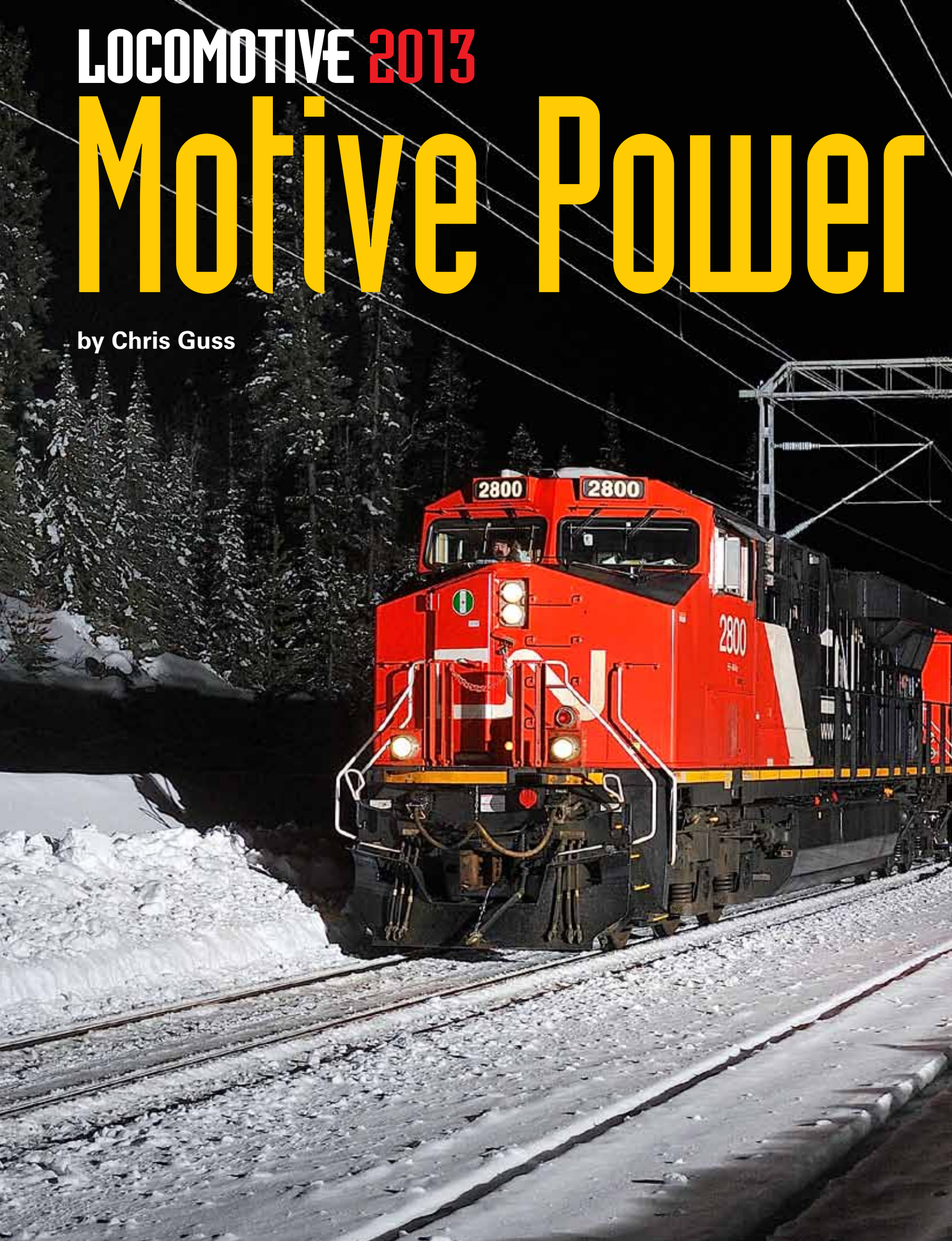
NRE

NATIONAL RAILWAY EQUIPMENT CO.
888-823-8391 | WWW.NATIONALRAILWAY.COM

LOCOMOTIVE 2013

Motive Power

by Chris Guss



review

- GE opens in Fort Worth
- EMD inks passenger deal
- AC triumphs on CN
- Siemens debuts ACS-64

Is D.C. traction dead? Canadian National, the last D.C. holdout, has gone A.C. with two orders for GE ES44ACs. Working under de-energized catenary that once hosted BC Rail electrics, CN 2800 and three newly delivered sisters head northbound coal train C762 at Techeeda, British Columbia, on March 22, 2013.
Jeff Robertson

BNSF ES44C4s began rolling off the assembly line at GE Transportation's new locomotive plant in Fort Worth, Texas, in March 2013. One of the first to be completed, BNSF 7101 rides the transfer table. GE: Steve Gerbracht

Without fanfare, BNSF ES44C4 No. 7103 quietly rolled out of GE Transportation's new production facility in Fort Worth, Texas, on March 1, 2013. Its delivery to BNSF began a new era of locomotive production for the worldwide conglomerate. The second new U.S. locomotive production plant to open in as many years, GE's Fort Worth plant was designed for locomotive and mining manufacturing, similar to its long-established plant in Erie, Pa.

Employing approximately 300 workers, GE Fort Worth pales in comparison to Erie's workforce, some 5,500 strong. But just as GE was celebrating the Fort Worth rollout, Erie workers received news that the company intended to furlough as many as 1,050 of their numbers.

Negotiations between GE and United Electrical, Radio, and Machine Workers Union Local 506 failed to secure concessions to avert the transfer of work and resultant elimination of the Erie jobs. In late June, GE announced that Erie layoffs would begin in October and domestic locomotive production would be transferred to the plant in Fort Worth.

GE Transportation's Evolution Series continues to be a worldwide best seller. Domestic deliveries in 2013 include 81 CSX, 60 Union Pacific, 25 Norfolk Southern, and 40 Canadian National ES44ACs. BNSF, the lone purchaser of the A1A-A1A ES44C4, took 175 more this year, giving the road a staggering 675 copies of the model.

In the export trade, it's diversity that sells, and the shop floor at Erie has been filled with locomotives of all shapes and sizes, from monstrous ES44DCi models for Rio Tinto in Australia, and B-B+B-B DASH 9-40BBWs for Vale VLi in Brazil, to diminutive narrow-gauge CM20-EMP C-Cs bound for PTKA in Indonesia. Construction of the double-ended, FDL8-powered, PTKA CM20-EMPs began in 2012 and will extend into 2014.

Progress Rail subsidiary Electro-Motive Diesel is expected to deliver more than 200 locomotives this year, including units manufactured at its Muncie, Ind., facility, opened in 2011, as well as SD70ACes built under contract by Bombardier Transportation in Sahagún, Mexico. Progress also opened a new South American plant in Sete Lagoas, in the state of Minas Gerais, Brazil.

EMD has yet to ink orders for the derivatives of its mainstream SD70ACe model, the SD70ACe-P6 and SD70ACe-P4. The SD70ACe-P6 features single-axle controls with one inverter per axle versus EMD's standard one-inverter-per-truck design. The SD70ACe-P4, a six-axle locomotive with four traction motors in a unique B1-1B configuration, is EMD's answer to GE's A1A-A1A ES44C4. EMD built test bed locomotives for both models.

Orders for conventional SD70ACes continue to roll in. BNSF has signed for 100 units in late 2013, while Union Pacific has ordered 40, and Norfolk Southern 25. Iron ore carriers in northern Quebec and Labrador have added another 20 units to EMD's order books: 10 each for Quebec North Shore & Labrador Railway and ArcelorMittal Canada.

Keeping Muncie busy are exports for Australia, Saudi Arabia, the United Arab Emirates, Chile, and Indonesia. Two Australian mining concerns have contracted for low-clearance SD70ACe/LC models: BHP-Australia for 29, Fortescue Metals for two. Other export contracts include a 10-unit GT46ACS order for Saudi Rail Org in Saudi Arabia, a seven-unit SD70ACS order from Etihad Rail in the United Arab Emirates, six GT46ACs for Ferrornor Chile, and 44 GT38ACs for PTKA in Indonesia.

Canadian Pacific, thus far the only major customer for EMD's ECO line has exercised a third option in its order. After taking delivery of its first 30 GP20C-ECOs, CP has

2012 New Locomotive Construction

GE: 649; EMD/Progress Rail: 293; NREC: 48 (estimated); MPI: 23

Railroad	Qty.	Road number	Builder	Type	Order/Serial No.	Build date	Notes
America Latina Logistica (Brazil)	7	8300-8306	GE	DASH 9-40BBW	60989-60995	02/12	
ArcelorMittal Canada	5	9001-9005	EMD	SD70ACe	20116598	10/12*	1
BHP (Australia)	17	4374-4390	EMD	SD70ACe/LC	20108424	03/12*	1
BHP (Australia)	12	4391-4402	EMD	SD70ACe/LC	20118575	10/12*	1
BNSF	175	6850-6869, 6900-7054	GE	ES44C4	60814-60988	01/12-06/12	4
BNSF	46	7055-7099, 6508	GE	ES44C4	61201-61245, 61421	07/12-08/12, 11/12	
BNSF	80	9050-9129	EMD	SD70ACe	20116683	07/12-12/12*	2
Camrail (Cameroon)	4	CC2501-CC2504	NREC	E3000-CUN	**	**	
Camrail (Cameroon)	4**	CC**-CC**	NREC	E2300-CUN	**	**	
CBH (Australia)	11	CBH001-CBH011	MPI	MP27CN	2363-01 to -11	03/12-06/12	5
CBH (Australia)	6	CBH012-CBH017	MPI	MP33CN	2363-12 to -17	07/12 -08/12	6
CBH (Australia)	5	CBH018-CBH022	MPI	MP33C	2363-18 to -22	08/12-10/12	7
CN	25	2800-2824	GE	ES44AC	61266-61300	11/12-12/12*	
CP	22 (30)	2200-2221	EMD	GP20C-ECO	20107386	12/12	
CP	30	9350-9379	GE	ES44AC	60715-60744	01/12 -02/12	
Cerrejon (Colombia)	4	1015-1018	GE	ES44AC	61301-61304	09/12	
CitiRail	15	1201-1215	GE	ES44AC	61406 - 61420	09/12-11/12	
CSXT	2 (4)	1322, 1324	NREC	3GS21B-DE	058-0217, -0218	01/12	
CSXT	65	3000-3064	GE	ES44AC	61123-61187	03/12-06/12	
CVG (Venezuela)	2	1069, 1070	EMD	SD70ACe	20118661	07/12*	2
EMD	5	1201-1205	EMD	SD70ACe	20116604A	05/12	3,8
EMD	5	1206-1210	EMD	SD70ACe	20116676	07/12	1,9
EMD	1	4223	EMD	SD70ACe	20116529	01/12	1,10
Eramet Comilog Manganese (Gabon)	6	CC4301-CC4306	EMD	GT46AC	20108415	08/12	1
Exxaro (Republic of Congo)	1 (4)	NR148	NREC	Genset**	**	12/12	
Fortescue Metals Group (Australia)	8	701-708	EMD	SD70ACe/LCi	20118611	03/12-04/12*	1
Fortescue Metals Group (Australia)	11	709-719	EMD	SD70ACe/LCi	20118693	11/12	1
GECX	2	2015, 2014	GE	ES44AC	60812-60813	08/12	11
KCS	20	4790-4809	GE	ES44AC	61246-61265	08/12-10/12	
KCS	10	4130-4139	EMD	SD70ACe	20116604	08/12	3,8
Neptune Bulk Terminals	1	809	NREC	3GS21B	058-0223	05/12	
Neptune Bulk Terminals	1	809A	NREC	TEBU	058-0224	05/12	
New York City Transit Authority	1 (28)	OL912	MPI	MP8AC-3	2204-01	04/12	12
NS	10	1065-1074	EMD	SD70ACe	20116573	05/12	1,13
NS	25	8091-8115	GE	ES44AC	60745-60769	01/12-03/12	4,14
NS	25	8116-8140	GE	ES44AC	61706-61730	09/12-12/12	
PTKA (Indonesia)	18 (100)	CC206 13 01 and up	GE	CM20-EMP	61309-61368,61771-61810	09/12-05/13*	
Qube (Australia)	6 (8)	1102,1104-1108	NREC	E3000E3B	**	02/12 – 04/12	
QNS&L	10	514-523	EMD	SD70ACe	20116688	12/12*	2
Rio Tinto (Australia)	3	8172-8174	GE	ES44DCi	60770-60772	10/11-12/11	
Rio Tinto (Australia)	12	8175-8186	GE	ES44DCi	60773-60784	01/12-02/12	
Setrag (Gabon)	2 (4)	CC405-CC406	EMD	JT42CWRM	20108460	02/12	1
SNIM (Mauritania)	7	CC122-CC128	EMD	SD70AC	20088052	01/12-02/12 *	1
SRO (Saudi Arabia)	26**	3520-3545**	NREC	S2000C	**	06/12-2013?	
UP	127	7925-8051	GE	ES44AC	60996-61122	03/12-09/12	
UP	73	8711-8783	EMD	SD70ACe	20116557	01/12-06/12	2,3,15
US Army	3	6510-6512	NREC	3GS21B	**	04/12*	
Vale (Brazil)	7	101-107	EMD	SD80ACe	20098322	01/12-03/12*	3,16
Vale (Brazil)	12	225-236	GE	ES58ACi	60800-60811	02/12-03/12	
Vale (Brazil)	7	237-243	GE	ES58ACi	61731-61737	09/12-12/12	
Vale VLi (Brazil)	15	6020-6034	GE	DASH 9-40BBW	60785-60799	02/12-03/12	17
Vale VLi (Brazil)	16	6035-6050	GE	DASH 9-40BBW	61379-61399	08/12-11/12	17

Quantities in parenthesis are total number of units in that order if different from 2012 production. Locomotives considered rebuilds are not included.
* Estimated build date, unconfirmed by publication date. **Details are unconfirmed.

Notes:

1. Built by Progress Rail Manufacturing Corp., Muncie, Ind.
2. Built by Bombardier at Ciudad Sahagún, Mexico.
3. Built by EMD London, Ont.
4. Some units were released from GE in primer and painted at Mid-America Car in Kansas City, Mo.
5. Narrow gauge, powered by Tier 2, 2,700-hp Cummins QSK-60 engine. Locomotive weight is 105.33 tons.
6. Narrow gauge, powered by Tier 2, 3,200-hp Cummins QSK-60 engine. Locomotive weight is 120 tons.
7. Standard gauge, powered by Tier 2, 3,200-hp Cummins QSK-78 engine. Locomotive weight is 132 tons.
8. Fifteen units in this order were completed or under construction at EMD London, Ont., when the plant shutdown commenced in February 2012.
   The original order number for London units was 20016528, but changed to 20116604B and 20116604A to identify two groups.
   A few from the 2100-2109 group were completed and plated as 2011 builds, but were re-plated when actually released in 2012.
9. These units were added to the lease fleet group and were built at Muncie, Ind.
10. Technology Demonstrator.
11. EPA Tier 4 emissions prototypes.
12. First NYCTA unit released as number 911, changed to 912 to avoid reference with 9/11 attack. NYCTA designation for these units is R156 after the project number.
13. All 10 were delivered in Norfolk Southern heritage paint schemes.
14. Nine units delivered in primer and painted in heritage schemes by Norfolk Southern shops.
15. Thirteen were completed or under construction at London when the plant shutdown commenced in February 2012. UP 8764-8776 were completed at London, Ont.
16. Shipped in primer from EMD London, Ont., for completion at Canadian Rail Collision & Refurbish in Toronto, Ont.
17. Value of Integrated Logistics. This is the former FCA.

Data prepared by Sean Graham-White

2013 Locomotive orders and deliveries to date

Railroad	Qty.	Road numbers	Builder	Type
Amtrak	70	600-669	Siemens	ACS-64
Amtrak	2	592, 593	MPI	MP14B
BHP (Australia)	29	4403-4431	EMD	SD70ACe/LC
BNSF	175	6508-6599, 7100-7182	GE	ES44C4
BNSF	100	8750-8799, 9000-9049	EMD	SD70ACe
CN	40	2825-2864	GE	ES44AC
CFCL Rail (Australia)	10	3301-3310	MPI	MP33C
CP	48 (30)	2222-2269	EMD	GP20C-ECO
CSXT	81	3065-3145	GE	ES44AC
Etihad Rail (UAE)	7	45001-45007	EMD	SD70ACS
Fortescue Metals (Australia)	2	720-721	EMD	SD70ACe/LCi
GECX	5	2016-2020	GE	ES44AC
GO Transit	10	657-666	MPI	MP40PH-3C
MBTA	40	1200-1239	MPI	HSP46
Montana Rail Link	2	4400-4401	EMD	SD70ACe
New York City Transit Authority	27 (28)	OL913-OL939	MPI	MP8AC-3
NREX	4	1203-1206	NREC	3GS24C-DE-AU
NS	25	1075-1099	EMD	SD70ACe
NS	25	8141-8165	GE	ES44AC
PTKA (Indonesia)	82 (100)	CC206 13 01 and up	GE	CM20-EMP
PTKA (Indonesia)	44	CC20507-CC20550	EMD	GT38AC
Qube (Australia)	3	1109-1111	NREC	E3000E3B
Rio Tinto (Australia)	10	8187-8196	GE	ES44DCi
Saudi Rail Org (Saudi Arabia)	10	4300-4309	EMD	GT46ACS
Tri-Rail, South Florida Transit	12	818-829	Brookville	BL36PH
Sound Transit	3	921-923	MPI	MP40PH-3C
Tasrail (Tasmania)	17		PR	PR22L
UP	60	8052-8111	GE	ES44AC
UP	40	8784-8823	EMD	SD70ACe
U.S. Army	3	6513-6515	NREC	3GS21B
Vale Vitoria (Brazil)	2	1310-1311	GE	DASH 9-40BBW
Vale VLi (Brazil)	17	6175-6191	GE	DASH 9-40BBW

Quantities in parenthesis are total number of units in that order if different from 2013 production.
Notes: Deliveries of Amtrak ACS-64 and MBTA orders will go beyond 2013. GE Indonesia order began deliveries in 2012. Data prepared by Sean Graham-White

Far from the Northeast Corridor, Amtrak 602, one of 70 ACS-64 electrics being built by Siemens, basks in the California sun at its Sacramento debut in May 2013. David Lustig

returned for 40 more. Conversely, the road has taken just 20 SD30C-ECOs rebuilt from SD40-2s. CP has hinted that it may take all 150 of the optioned GP20C-EOCs; future SD30C-ECO purchases are undecided. The GP20C-ECOs are based in St. Paul, Minn., and have settled into yard and local service on former Soo and Milwaukee Road trackage in the Midwest.

Belt Railway of Chicago, with three GP23ECOs on order for 2013, will become the first owner of Tier 3-compliant ECOs. The BRC units are being constructed by Progress Rail's Tacoma, Wash., shop with delivery planned for later this year.

Another first for the ECO line is a two-unit order for GP31ECOs from Southern Peru Copper. Constructed using retired GP40s as cores, the locomotives are the first four-axle re-powers to employ the 3,000-hp 12-710ECO prime mover.

Return of the F Unit

EMD is back in the passenger business, with the announcement of its new F125 Spirit and subsequent confirmation of a 10-unit order from the Southern California Regional Rail Authority, better known as Metrolink. Providing EMD with its first passenger locomotive order in two decades, Metrolink has signed for 17 F125s, and has an option for 13 more.

The F125 incorporates EMD, Caterpillar, and Vossloh technologies, including a streamlined, monocoque carbody designed by Vossloh Rail Vehicles; a 4,700-hp, four-stroke, 20-cyclinder, Caterpillar C-175 diesel engine; an A.C.-traction propulsion system; VRV high-speed running gear, and inverter-controlled head-end power. The F125 is compliant with next-generation Passenger Rail Investment and Improvement Act specifications, and designed to fulfill either commuter or intercity requirements for new passenger locomotives.

Progress Rail will begin delivering a 17-unit order for narrow-gauge PR22Ls to Tasrail in Tasmania. Construction of the locomotives, based on EMD's GT26 but fitted with Caterpillar 3512-series engines and Kato generators, will carry into 2014.

The most anticipated locomotives of the year, the first three of 70 Siemens ACS-64 electrics being built for Amtrak, were unveiled at the company's plant in Sacramento, Calif., in May. Destined to take over locomotive-hauled services on Amtrak's Boston-Washington Northeast Corridor and Philadelphia-Harrisburg, Pa., Keystone line, the 8,600-hp ACS-64 is based on the successful Siemens Vectron platform introduced in Europe in 2010.

Two units, Amtrak 600 and 601, will be tested at the Transportation Technology Center test track in Pueblo, Colo., while No. 602 will undergo certification testing on the Northeast Corridor.

The first 10 shells were constructed in Munich, Germany, and were shipped to Sacramento for completion. The remainder of the fleet will be produced by Siemens facilities in the United States. The new locomotives are equipped to operate under three system voltages (25kV 60Hz, 12kV 60Hz, and 12kV 25Hz) and have the ability to haul up to 18 coaches at 125 mph. Amtrak anticipates having all 70 locomotives in service by 2016.

Boise, Idaho-based Motive Power has 40 HSP46 A.C.-traction commuter locomotives on the books for Boston's MBTA. The 4,600-hp locomotives will feature GE propulsion systems, including GEVO-12 prime movers. Boise is also building 10 Cummins QSK78-18-powered MP33C locomotives for CFCL Rail in Australia, while the New York City Transit Authority will receive the balance of a 28-unit MP8AC-3 order that began delivery in 2012. Perennial MPI customer GO Transit returned for 10 MP40PH-3Cs to support its commuter services around the Toronto area, while Sound Transit will get three MP40PH-3Cs for its Seattle commuter operations. Also on order for Amtrak are two MP14B genset switchers.

Brookville Equipment's 12 Cesar Vergara-styled, 20-cylinder MTU 20V4000-powered BL36PH commuter locomotives for

Glistening in factory-fresh paint, Mexican-built UP SD70ACe No. 8763 teams with SD70M No. 4100 rolling southbound intermodal train ZYCHO through Beecher, Ill., on June 26, 2012. Marshall W. Beecher

Ready for delivery, ES44ACs for KCS, CitiRail, CN, and NS pose outside GE's Erie, Pa., plant. Greg McDonnell

CN has purchased all but 10 of the 100 Oakway SD60s built in 1986 for "power by the hour" lease to Burlington Northern. Freshly painted CN 5440, formerly EMDX 9095, drifts down Byron Hill near Fond du Lac, Wis. Drew Halverson

South Florida Regional Transportation Authority are under construction. The agency has options to purchase as many as 17 units for its Tri-Rail commuter trains serving Miami, Fort Lauderdale, and Palm Beach.

Norfolk Southern's Juniata shop in Altoona, Pa., is constructing seven RailPower RP20BDs for Dallas Garland & Northeastern. Central Railroad of Indiana also received two RP20BDs this year. Both railroads are former RailAmerica properties, and all nine gensets have been delivered in Genesee & Wyoming orange and black.

National Railway Equipment will build three 2GS21Bs for the U.S. Army, along with a single E300E3B for itself.

Secondhand market

Canadian National just can't seem to get enough secondhand power. After purchasing 35 onetime Chicago & North Western DASH 8-40Cs, 67 BNSF DASH 8-40CWs built for Santa Fe, and 43 former Oakway "power by the hour" SD60s, CN has picked up 47 more of the blue-and-white EMDs. This latest acquisition gives CN 90 of the 100 Oakway SD60s built in 1986 for lease service on Burlington Northern.

Genesee & Wyoming's takeover of RailAmerica has the company shifting locomotives from property to property to meet local demands. But the most visible change is an ambitious program to repaint RailAmerica locomotives. Many former RailAmerica properties already operate one or more locomotives painted in G&W's attractive orange-and-black scheme as paint crews apply the family colors to everything from CF7s to former SP tunnel motors.

In a gaseous state

CN started the current Class I push into liquefied natural gas testing late last year with a pair of modified SD40-2s toting a 1990s-era LNG fuel tender updated with the latest equipment to support the locomotives. Energy Conversions Inc., the same company that performed LNG testing with Burlington Northern in the early 1990s, designed the system. The basic concept used over two decades ago was installed on the Canadian National locomotives with various updates to the system to incorporate technological improvements made to certain components. The pair is testing on CN lines north of Edmonton, Alberta. CN is also testing a joint Caterpillar and Vancouver, British Columbia-based Westport Innovations LNG gas system. CN provided two SD70M-2s to EMD for application of the

Genesee & Wyoming is showing the flag on newly acquired RailAmerica lines. Fresh from the paint shop, New England Central SD40T-2 No. 3317 rests outside the roundhouse at St. Albans, Vt. Kevin Burkholder

Caterpillar/Westport LNG system. GE Transportation is also actively developing Evolution-based LNG prototypes.

There are many differences between the two competing technologies. The Energy Conversions system will run on pure diesel or a blend of LNG and diesel, while the Westport Innovations version is designed to run only on a blend of LNG and diesel.

BNSF will begin testing LNG in 2013 by modifying several EMD and GE locomotives for gas operation. The first two BNSF SD70ACes for the project were at EMD in La Grange, Ill., this spring for modifications.

As the clock ticks ever closer to the 2015 implementation of Tier 4-emissions regulations, GE took the lead, introducing the first Tier 4 locomotive. GE 2015, an ES44AC Tier 4 test bed, made its debut in Erie on Aug. 12, 2012. Erie is constructing more Tier 4 prototypes. In addition, a cabless, six-axle platform, one of two built as test beds for 6,000-hp HDL engines, has been rebuilt to serve as a Tier 4 test bed at Erie.

EMD is playing its Tier 4 cards a bit closer. The company reportedly has Tier 4 engines undergoing tests at its La Grange plant, and possibly elsewhere. There is no hint of when, or if, a prototype locomotive will be constructed.

While the challenge to meet Tier 4 compliance looms large, LNG could prove to be a game changer. ⊥

ES44AC Tier 4

The first new-build, Tier 4-capable locomotive, GE ES44AC No. 2015 made its formal debut in Erie, Pa., on Aug. 24, 2012. Two photos, Greg McDonnell

North American locomotive builders have been scrambling to develop new technology to meet EPA Tier 4-emissions regulations that take effect Jan. 1, 2015. For the most part, these efforts have been understandably shrouded in mystery, but GE Transportation has made its process somewhat transparent.

As soon as the upcoming regulations were announced, GE began consulting with customers to understand their requirements for a Tier 4 product. Infrastructure readiness, product reliability, maintainability, fuel efficiency, and a non-urea based technology were critical demands. The latter has been almost universally rejected as an acceptable option.

GE engineers went to work, and on Aug. 24, 2012, ES44AC 2015, the first new-build, Tier 4-capable locomotive, burst through a ceremonial banner at the builder's Erie, Pa., plant. Since its unveiling, No. 2015, along with newly constructed sister No. 2014, and a stationary test bed have spent more than a year undergoing exhaustive tests for emissions compliance, performance, and component reliability. During the past decade, GE has spent more than $600 million on technologies developed to meet emissions standards while simultaneously improving reliability, fuel efficiency, and operator comfort.

GE 2014, the second ES44AC Tier 4 test bed, undergoes testing in Erie, Pa.

The Evolution Series has sold nearly 6,000 locomotives worldwide since 2005. While the bright-blue-and-green units will serve as engineering prototypes, GE is finalizing plans for additional pre-production tests across the country.

Some 53 years after the original "Bluebird" U25B demonstrators led GE into the domestic locomotive market, the latest Tier 4-technology test beds will do the same — barnstorming throughout the country to test a revolutionary design in real-world-operating conditions.

The countdown to Tier 4 is on, and GE locomotives are racking up hours of service in anticipation of the 2015 launch. 1

ES44AC Tier 4 prototype specs

Model	ES44AC
Emissions compliance	EPA Tier 4
Engine type	GE GEVO-12
Number of cylinders	12 cylinder, V-type
Traction horsepower	4,400
Axle configuration	C-C
Control system	GE consolidated control architecture
Traction configuration	A.C./A.C., inverter-per-axle
Truck	GE hi-adhesion (standard)
Wheel size	43 inches
Length	74 feet, 6 inches
Height	16 feet, 1 inch (over antennas)
Weight	426,000 pounds
Crashworthiness	S-580 compliant

>> Get the latest on locomotives on TRAINS News Wire. Visit www.TrainsMag.com

A TOGNUM GROUP BRAND

It’s the first to arrive.

The global leader in rail technology is proud to introduce another first: the new Series 4000 R54 engine. Certified to meet EPA Tier 3 locomotive emissions standards, it’s the first single engine to provide 2000-plus traction horsepower and meet CARB ULEL emissions standards without exhaust gas aftertreatment. The Series 4000 R54’s environmentally friendly, maintenance-friendly design also features exceptional power—12V and 16V models deliver 2,400 hp and 3,200 hp respectively.

www.mtu-online.com

Power. Passion. Partnership.

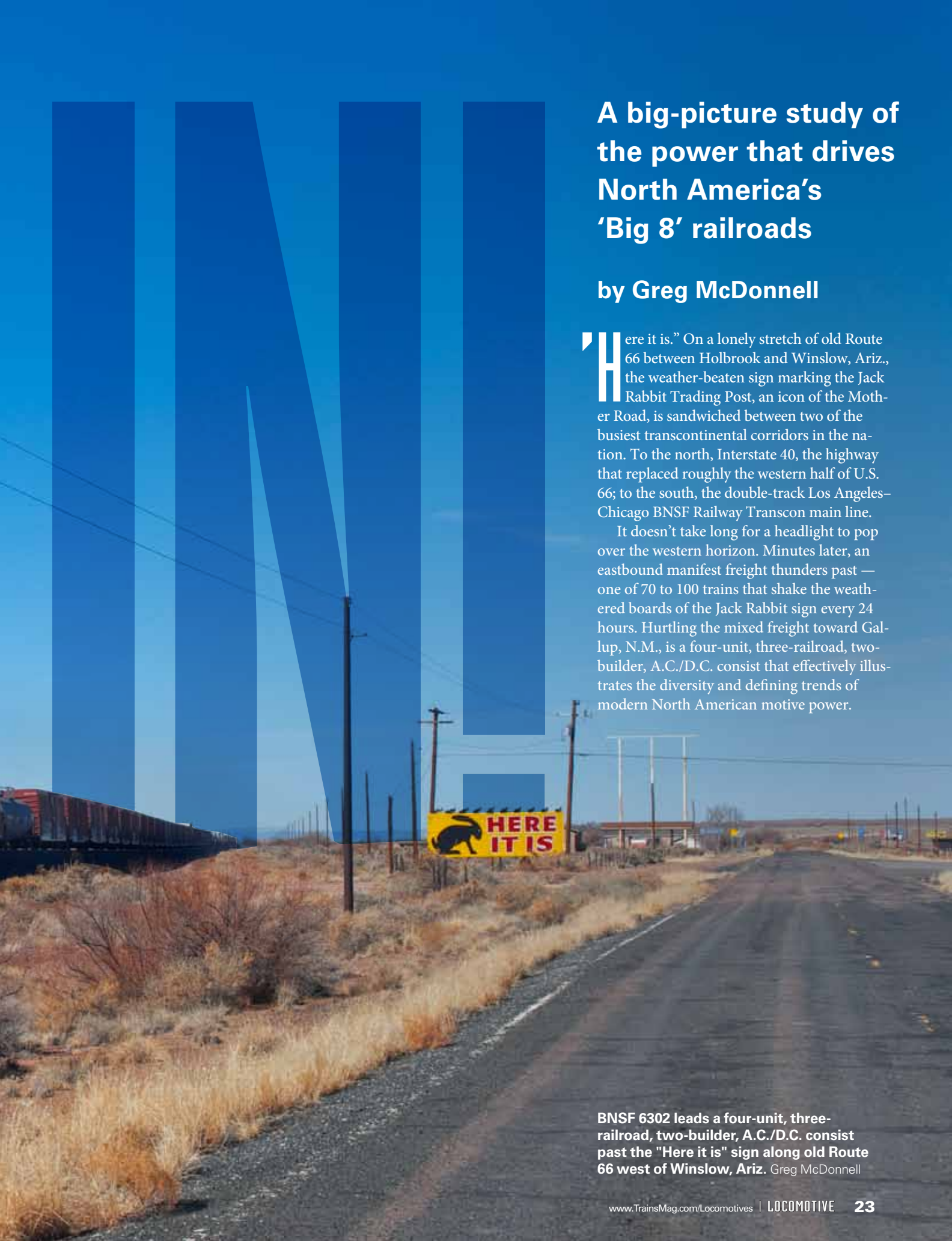

ALL

A big-picture study of the power that drives North America's 'Big 8' railroads

by Greg McDonnell

"Here it is." On a lonely stretch of old Route 66 between Holbrook and Winslow, Ariz., the weather-beaten sign marking the Jack Rabbit Trading Post, an icon of the Mother Road, is sandwiched between two of the busiest transcontinental corridors in the nation. To the north, Interstate 40, the highway that replaced roughly the western half of U.S. 66; to the south, the double-track Los Angeles–Chicago BNSF Railway Transcon main line.

It doesn't take long for a headlight to pop over the western horizon. Minutes later, an eastbound manifest freight thunders past — one of 70 to 100 trains that shake the weathered boards of the Jack Rabbit sign every 24 hours. Hurtling the mixed freight toward Gallup, N.M., is a four-unit, three-railroad, two-builder, A.C./D.C. consist that effectively illustrates the diversity and defining trends of modern North American motive power.



BNSF 6302 leads a four-unit, three-railroad, two-builder, A.C./D.C. consist past the "Here it is" sign along old Route 66 west of Winslow, Ariz. Greg McDonnell

A BNSF coal train in the charge of UP SD90MAC No. 8304, CSX AC6000CW No. 5002, and BNSF ES44AC No. 6386 crosses the Clark Fork River between Thompson Falls and Belknap, Mont., on Montana Rail Link's 4th Sub on Sept. 20, 2012. Tom Danneman

They're an eclectic lot: BNSF ES44AC No. 6302, CSX Dash 8-40CWs Nos. 7809 and 7843, and Union Pacific SD70M No. 4730. Together, they represent the Big Two builders and some of the best-selling locomotive lines in North America. They're also members of the three largest locomotive fleets on the continent, and examples of the apex of D.C.-traction technology, and state-of-the-art A.C. traction. And that's just for starters. They're just four of more than 28,500 locomotives employed in the service of the "Big 8" North American railroads: Amtrak, BNSF, Canadian National, Canadian Pacific, CSX Transportation, Kansas City Southern, Norfolk Southern, and UP.

So often, we're concerned with the minutia of motive power. But every now and again, it's a good idea to step back and look at the big picture. Who has the most locomotives? What is the best-selling model?

It's been 30 years since GE Transportation overtook Electro-Motive as the No. 1 locomotive builder in North America. So, just what are the GE vs. EMD statistics in the overall locomotive population? How do they stack up on a road-by-road basis?

Excluding Amtrak, the "Top 7" fleet posts an average age of 18.4 years. By builder, the EMD average is 24.6 years; for GE, it's 11.8 years. The oldest GEs are UP's 1987-vintage Dash 8s. Nearly 50 percent of the active EMD fleet was built before that date! Who has the oldest fleet? Who has the newest?

Is the high-horsepower D.C.-traction locomotive dead? None have been built or ordered since CN SD70M-2 No. 8964 rolled out of EMD London in December 2010. What are the road-by-road and overall A.C. vs. D.C. stats?

So here it is: A big-picture study of the power that drives North America's "Big 8" railroads. All in!

Top 7 freight fleet overview

Total fleet size	28,155
Six-axle vs. four-axle by percentage	C-C: 77%, B-B: 23%
A.C. vs. D.C. by percentage	A.C.: 32%, D.C.: 68%
Builders by percentage	EMD: 52%, GE: 47%, Other: 1%
Model count	158
Top five models	Dash 9-44CW: 3,362 AC4400CW: 2,799 ES44AC: 2,686 GP38-2: 2,167 SD40-2: 2,162
Percentage of top 5 models vs. total	47%
Percentage 4,000 hp and higher	63%
Percentage by type:	
Switcher/genset	3.2%
Slug	1.9%
EMD GP	17.2%
EMD SD (less than 3,500 hp)	10.5%
EMD SD (greater than 3,500 hp)	10.4%
EMD MAC	5.2%
EMD ACe	4.0%
GE DASH 8/DASH 9	18.7%
GE AC4400CW/AC6000CW	11.0%
GE Evolution	16.6%
Other/special	0.1%
Average age	18.4 years

* Includes 1,086 Norfolk Southern Dash 9-40CW. Top 7 data excludes Amtrak.

Railroad	Total fleet	2004-2013 deliveries	GE	EMD	Other	Percentage delivered in past decade
BNSF	7,106	2,826	2,314	407	105	40%
CN	2,008	410	220	190		20%
CP	1,639	425	375	50		26%
CSX	4,211	955	704	167	84	23%
KCS	981	319	159	158	2	33%
NS	4,025	1,155	527	362	266	29%
UP	8,185	2,068	1,134	742	192	25%
Total	28,155	8,158	5,433	2,076	649	29%

* Tabular data updated to June 2013; specific totals can fluctuate almost daily.

UNION PACIFIC STILL THE BIGGEST

UP SD70Ms speed an eastbound stack train near Cokeville, Wyo., on Jan. 20, 2013. Mike Danneman

Union Pacific has long been synonymous with "biggest in the industry." From Big Boy 4-8-8-4s in steam days, to the giant double-engined diesel monsters of the 1960s, UP has always tended toward the extreme. It's no surprise that today's UP fleet can stake similar claims.

UP's current fleet numbers nearly 8,200 locomotives — more than four times the size of the CN fleet, and equivalent to CSX and NS combined. Similar to that of western neighbor BNSF, UP's fleet skews toward high-horsepower locomotives, with nearly 70 percent rated at 4,000 hp or greater. Translated, that's nearly 5,600 locomotives! Even the road's oddball SD9043MACs, some 306 strong, are a drop in the bucket, representing 3.5 percent of the UP fleet.

Following a decade-long absorption of the Southern Pacific and Chicago & North Western fleets, today's UP roster is pared down — lean, mean, and standardized. The lease and subsequent purchase of nearly 1,450 SD70Ms between 2000 and 2004 allowed the road to eliminate scores of aging GE Dash 7s and EMD tunnel motors. At the same time, UP re-equipped its coal fleet with GE AC4400CWs. With the inclusion of units from C&NW and SP, the AC4400 is the most common model on the roster, with 1,485 examples.

Since EPA Tier 2 emissions rules took effect in 2005, UP's locomotive-purchasing

Total fleet size	8,185
Six-axle vs. four-axle by percentage	C-C: 79% , B-B: 20%, Other: 1%
A.C. vs. D.C. by percentage	A.C.: 42%, D.C.: 58%
Builders by percentage	EMD: 57%, GE: 41%, Other: 2%
Model count	42
Top five models	AC4400CW: 1,485 SD70M: 1,445 ES44AC: 943 GP38-2: 664 SD40-2: 505
Percentage of top 5 models vs. total	62%
Percentage 4,000 hp and higher	68%
Percentage by type:	
Switcher/genset	4.3%
Slug	0.7%
EMD GP	15.6%
EMD SD (less than 3,500 hp)	7.3%
EMD SD (greater than 3,500 hp)	21.7%
EMD MAC	3.7%
EMD ACe	6.3%
GE Dash 8/Dash 9	8.2%
GE AC4400CW/AC6000CW	20.4%
GE Evolution	11.5%
Other/special	0.1%
Average age	17.8 years

Background photo by Mike Danneman

By the end of 2013, UP will have 1,003 ES44ACs. UP 8010 works an eastbound freight at West Colton Yard in Colton, Calif., in March 2013. Greg McDonnell

strategy has been consistent, annually selecting one or both of the builders' standard offerings: GE's ES44AC and EMD's SD70ACe. By the end of 2013, UP will roster 1,003 Evolutions and 517 ACes (bumping the ACe into the Top 5 in place of the SD40-2).

Nearly 1,100 GP15-1s, GP38-2s, and GP40-2s form UP's four-axle fleet. The units hail from a variety of backgrounds, though UP has worked to standardize them for a wide range of secondary applications.

A leader in the development of the new generation of switchers, UP quickly assembled a fleet of 21 RailPower Green Goats and later some 165 genset switchers from RailPower and NREC. While the oldest Green Goats were recently retired, the rest soldier on as replacements for EMD SW1500s and MP15s. Once a haven for hundreds of former SP end-cab switchers, UP rosters a dwindling 157 or fewer today.

UP's innovation didn't stop with switchers. In 2010, the road investigated rehabilitation options for its aging SD60s, contracting with EMD to perform ECO upgrades on 20 SD60Ms. Designated SD59M-2 by EMD

Fast facts

- UP's locomotive fleet is equivalent in size to that of CSX and NS combined.
- UP's SD70M fleet represents 80 percent of the D.C. locomotives EMD has built for North America since 2000.
- Active locomotives in UP's historic diesel fleet include an A-B-A set of E9s — Nos. 951, 963B, and 949 — and DDA40X No. 6936.
- UP rosters two active steam locomotives for special trains: 4-8-4 No. 844 and 4-6-6-4 No. 3985.

Three of UP's 1,485 AC4400CWs, the top dogs on the roster, work a westbound grain train at Topaz, Idaho, in January 2013. Two photos, Mike Danneman

EMDs stand in the snow at Denver's North Yard in April 2013.

and SD59MX by UP, the 3,000-hp rebuilds feature EMD's 12-cylinder, Tier 2-compliant ECO 710 prime mover. Ten SD59M-2s received more extensive modifications, serving as test beds for advanced emissions technologies. Class unit UP No. 9900 is equipped with EGR (exhaust gas recirculation) and exhaust-filtration technologies allowing the locomotive to test at EPA Tier 4 emissions standards. Meanwhile, the future of UP's aging 505-unit SD40-2 fleet seems secure. UP is putting SD40-2s through an extensive "SD40N" overhaul/upgrade program at its shop in North Little Rock, Ark. Initiated in 2010, the program has given 220-and-counting SD40-2s new life. UP could readily complete another 250 should it take aim at the remainder of the fleet.

Recent downturns in traffic, particularly in coal, have forced a significant number of UP units into storage. Reports indicate that UP has in excess of 1,000 units parked, evidenced by long lines of stored Dash 8s, SD60s, and even modern SD70Ms at terminals around the system. Some may never see revenue operation again. In mid-2013, the former SP Dash 8-40B fleet and 50 long-stored Dash 8-40C locomotives had been stricken from the books. The quarter-century-old veterans did their part for UP, but it is unknown whether they will shuffle off to scrap or find new work. UP retains ownership of another 404 Dash 8s, a not-insignificant number that represents just 5 percent of the railroad's sea of Armour Yellow locomotives. Unlimited power indeed!

BNSF A MOTIVE POWER EVOLUTION

A westbound BNSF manifest with an ES44C4 in the lead cruises by Frog Pond west of Trout Creek, Mont. Tom Danneman

Total fleet size	7,106
Six-axle vs. four-axle by percentage	C-C, A1A-A1A: 83%, B-B: 17%
A.C. vs. D.C. by percentage	A.C.: 37%, D.C.: 63%
Builders by percentage	GE: 59%, EMD: 40%, Other: 1%
Model count	56
Top five models	Dash 9-44CW: 1,791
	SD70MAC: 785
	ES44DC: 721
	ES44AC: 715
	ES44C4: 630
Percentage of top 5 models vs. total	65%
Percentage 4,000 hp and higher	75%
Percentage by type:	
Switcher/genset	1.8%
Slug	0.2%
EMD GP	14.4%
EMD SD (less than 3,500 hp)	6.6%
EMD SD (greater than 3,500 hp)	2.6%
EMD MAC	11.0%
EMD ACe	4.9%
GE Dash 8/Dash 9	27.8%
GE AC4400CW/AC6000CW	1.7%
GE Evolution	29.2
Other/special	0
Average age	15.1 years

Background photo by Tom Danneman

To feel BNSF's heartbeat, head for the "Transcon," the former Santa Fe main between Chicago and Los Angeles. While the traffic base of the 32,500-mile railroad runs the gamut from Powder River coal to east Texas chemical traffic, any stop along the old Santa Fe main line will quickly show what makes BNSF tick. Headlight after headlight appears on both horizons as fleets of intermodal trains hustle the nation's goods at track speed behind today's most technologically advanced motive power. It's an exhilarating experience to watch, and the carrier's motive power strategies are closely tied to the rhythm and beat of this busy avenue of commerce.

Since 2005, BNSF has amassed a fleet of more than 1,400 GE Evolution-series locomotives that regularly handle the railroad's hottest intermodal schedules, a significant portion of which traverse the Transcon. Unique to BNSF, the A1A-A1A configured ES44C4 consolidates the reliability of A.C. technology with performance matching its older ES44DC and Dash 9 cousins. New-generation EVOs work side by side with the railroad's 1,791 Dash 9-44CW locomotives, although many Dash 9s have cascaded into regular freight and grain service, replacing aging second-generation EMDs and GE Dash 8s.

The coal fleet has evolved, too. In the past decade, BNSF has purchased 350

EMD SD70ACes and 715 GE ES44ACs to supplant its 785 SD70MACs, some of which are nearing their 20th birthday. Some are being retired, and with coal traffic down, SD70MACs in merchandise and other service are common sights.

BNSF has been the most aggressive of all Class I railroads in fleet replacement, purchasing more than 3,000 new locomotives in the last decade. Roughly 40 percent of the railroad's roster is less than 10 years old, and more than 80 percent of those locomotives have been built by GE.

The arrival of those new locomotives has sent ripples through the entire fleet. Dash 9s have moved into a wider range of services, and most of the road's six-motor Dash 8s have been stored or retired. CN quickly snapped up 67 retired Dash 8-40CWs.

BNSF has formally re-assigned its remaining SD40-2s into yard and local service, a move that pushed several hundred GP15-1, GP30, GP35, and GP39 locomotives into retirement. The purchase of nearly 100 gensets from National Railway Equipment allowed the railroad to eliminate all but a handful of traditional EMD end-cab switchers. In total, the traditional EMD switcher and GP population represents only 15 percent of the BNSF fleet, one of the lowest percentages of any Class I.

While gaining efficiencies with its fleet standardization, including delivery of 175 ES44C4s and 100 SD70ACes in 2013, BNSF's mechanical group is already evaluating the next game changer. In early 2013, the road announced that it is working with both GE and Caterpillar/EMD to develop road locomotives capable of operation on liquefied natural gas. Like the generations of Dash 9s and Evolutions before them, these locomotives could raise the bar for performance and efficiency.

Brand-new BNSF SD70ACe No. 9232 heads a Galesburg-bound coal train at Buda, Ill., in June 2008. Drew Halverson

Fast facts

- BNSF's Dash 9-44CW fleet is larger than CP's entire locomotive fleet.
- BNSF's fleet is 60 percent GE, the highest of any Class I railroad.
- BNSF is the only Class I railroad without a "classic" executive locomotive fleet.
- BNSF released a Hydrogen Fuel Cell/Hybrid demonstrator in 2009.
- BNSF rosters more than 5,400 wide-nose, "North American cab" locomotives, representing more than 75 percent of the total fleet, the highest of any Class I.

CSX ASSAULT ON THE ALLEGHENIES

On historic turf, CSX ES44ACs take an eastbound coal drag up Cranberry Grade at Amblersburg, W.Va. Brian Plant

Total fleet size	4,211
Six-axle vs. four-axle by percentage	C-C: 71%, B-B: 29%
A.C. vs. D.C. by percentage	A.C.: 32%, D.C.: 68%
Builders by percentage	EMD: 50%, GE: 49%, Other: 1%
Model count	50
Top five models	AC4400CW: 592
	ES44AC: 402
	SD40-2: 387
	Dash 8-40CW: 374
	GP40-2: 373
Percentage of top 5 models vs. total	51%
Percentage 4,000 hp and higher	53%
Percentage by type:	
Switcher/genset	4.0%
Slug	5.3%
EMD GP	18.9%
EMD SD (less than 3,500 hp)	14.9%
EMD SD (greater than 3,500 hp)	2.7%
EMD MAC	5.1%
EMD ACe	0.5%
GE Dash 8/Dash 9	14.9%
GE AC4400CW/AC6000CW	16.8%
GE Evolution	16.7%
Other/special	0.1%
Average age	21.4 years

Background photo by Drew Halverson

Sooner or later, every diesel enthusiast must make a pilgrimage to Amblersburg, W.Va. Here in the lush forests of northern Appalachia, one can stand trackside and look out over the former Baltimore & Ohio main line wrapped around a 9-degree curve before it disappears into the forest. Most don't realize how much the next 9 miles of track, and the climb to the Briery Mountain summit at Terra Alta, have defined today's generation of motive power technology.

Since the dawn of dieselization this famed Cranberry Grade has tested the mettle of everything from F units to SD40-2s and SD50s, as well as today's latest A.C. locomotives. This tortuous piece of main line has helped shape CSX's — and the continent's — motive power strategy for more than 20 years. Most of today's leading A.C. technologies have undergone developmental testing on Cranberry. This year alone, both EMD and GE have tested extensively on the mountain under CSX tutelage.

By all practical accounts, GE has a substantial lead in the pull toward the top of the mountain. Since the dawn of A.C. traction, CSX has purchased models from both builders, but has clearly favored GE, acquiring 1,157 A.C. locomotives from GE versus 205 from EMD. Indeed, since an order for 20 SD70ACe units in 2004, CSX has exclusively purchased from GE, amassing a

fleet of 402 ES44ACs and 302 ES44DCs.

Ballasted to the max for heavy-haul service, CSX ES44ACs weigh in at 432,000 pounds. Equipped with steerable trucks, the latest software, and high-power rail-cleaning devices, they're ideal for Cranberry. Most of the algorithms that allow trains to crest Donner Pass, the Canadian Rockies, and Blue Ridge summits have come thanks to GE locomotive design engineers who spent tough nights optimizing software on the climb out of the Cheat River Valley.

CSX initially employed A.C. traction exclusively in coal service, enabling unit reductions and the elimination of helper districts. Today, A.C. units work across the system. Mingled with 302 ES44DCs delivered during 2005-2007, 592 AC4400CWs and 402 ES44ACs make up the majority of the mainline CSX fleet. Once hailed as the future of motive power, 117 AC6000CWs fell into secondary service and storage, only to see a miraculous resurrection, complete with new controls and repowered with new GEVO16 engines. Today they have a second career back on the main line leading hotshots and intermodals.

CSX operates 235 EMD A.C. units, including 11 rare SD80MACs inherited from Conrail. Sixteen of the oldest SD70MACs recently found a home on the Paducah & Louisville, in which CSX has an ownership stake. In spring 2013, CSX tested the latest SD70ACe demonstrators from EMD. No order has been announced, but the race for A.C. supremacy in West Virginia is anything but over.

A surprisingly wide variety of older units fill out the CSX fleet, most of which continue to draw regular mainline assignments. Though U-boats and Dash 7s are gone, standard-cab fans can rejoice. From CSX's 387 SD40-2s to 156 standard-cab Dash 8-40Cs, classic motive power maintains a significant presence on CSX routes, particularly in former B&O territory and on routes across the Midwest.

One of the last Class I roads to roster SD50s, CSX operates 177, some of which were upgraded to Dash 3 specs by CSX shops (see pages 68-73). Between 2009 and 2011, 50 SD40-2s were also upgraded to Dash 3s at the CSX shop in Huntington, W.Va. Renumbered into the 4000-series, their unique CSX-designed cabs readily distinguish the 50 SD40-3s from their unrebuilt kin. While both programs have been suspended, the sheer volume of older six-axle units on CSX guarantees that many will labor on for years.

CSX still holds title to 796 four-axle EMD GPs and 177 road slugs, used in local and yard service. The road slugs — mated to a GP — retain their GP30, GP35, and GP40 carbodies, providing an extra dimension of interest. You can spot the slugs by their "clean" rooflines. Given the upgrade programs established by CSX, most of the four-axle fleet will likely outlive their six-axle brethren. CSX has made a move toward genset switchers, purchasing 40 from National Railway Equipment and RailPower over a six-year period, but the program hasn't made much of a dent in the ranks of CSX's 130 EMD end-cab switchers.

Catch the classics while you can: SD40-2s and Dash 8s on mainline freights and GP30 road slugs passing B&O color position light signals in Ohio. Savor the sound of massive AC6000s leading hotshot intermodals, and make the pilgrimage to Amblersburg. The flow of loaded coal trains may not be what it once was, but when they highball east from Rowlesburg to begin the assault on Briery Mountain, the sight and sound of the big GEs will clearly illustrate why Cranberry and A.C. locomotives are perfect for each other.

Its GP30 lines unspoiled, CSX road slug No. 2312 and GP40-2 mother 6414 pass McCarthy's pub in the First Ward section of Buffalo, N.Y.

At last count, CSX holds title to 177 SD50s and 387 SD40-2s. On Aug. 23, 2012, one of each, SD50 No. 8599 and SD40-2 8404, roll train Q263's auto racks into the sunset near North East, Pa. Two photos, Greg McDonnell

Fast facts

- **CSX, with 117 AC6000CWs, holds title to the largest fleet of 6,000-hp models.**
- **CSX is the largest operator of mother/slug sets, most of which are built from classic EMD GP30s and GP35s. More than 175 road slugs are paired with EMD GPs in a variety of services.**
- **The CSX executive fleet consists of four ex-Amtrak F40PH locomotives.**

NORFOLK SOUTHERN HERITAGE SCHEMES ON AC MACHINES

A pair of brand-new SD70ACes works at Clinton, Tenn., on a rainy Saturday afternoon in April 2013. Chris Starnes

Total fleet size	4,025
Six-axle vs. four-axle by percentage	C-C: 75%, B-B: 25%
A.C. vs. D.C. by percentage	A.C.: 6%, D.C.: 94%
Builders by percentage	EMD: 53%, GE: 46%, Other: 1%
Model count	44
Top five models	Dash 9-40CW: 1,086
	GP38-2: 502
	SD40-2: 435
	ES40DC: 220
	ES44AC: 141
Percentage of top 5 models vs. total	59%
Percentage 4,000 hp and higher	55%
Percentage by type:	
Switcher/genset	2.5%
Slug	3.2%
EMD GP	18.8%
EMD SD (less than 3,500 hp)	12.3%
EMD SD (greater than 3,500 hp)	14.0%
EMD MAC	0.4%
EMD ACe	2.5%
GE Dash 8/Dash 9	37.1%
GE AC4400CW/AC6000CW	0
GE Evolution	9.0%
Other/special	0.1%
Average age	18.6 years

Background photo by Tom Danneman

Who would have thought a little paint could cause so much excitement? Arguably the most-watched industry event in the last quarter-century, NS broke its "dress black" code for a splash of color on 20 of its newest 2012 locomotives. But not just any color, as NS carefully selected and applied the paint schemes from predecessor railroads. The result? A public relations coup, enthusiast jubilation, and a cult following for otherwise standard ES-44AC and SD70ACe locomotives. Placed into visible services throughout the system, the A.C. locomotives have broken out of specific mineral assignments and now see a wide range of duties, from traditional Appalachian helper service to high-speed intermodals. Several have roamed nationwide, working run-through assignments on connecting railroads, including coal and oil trains. This has not only gained increased publicity for the vibrant locomotives, but it has also given NS — a relatively recent convert — operational experience with A.C. locomotives in a wide variety of services.

A.C. traction is old news for most Class I railroads, but not so on NS, which purchased its first ones, 24 GE ES44ACs, in 2008. NS identified specific coal services on former Norfolk & Western, Virginian Railway, and Conrail lines that could justify the purchase of higher-priced A.C. locomotives through unit reductions. Placed into coal

train and helper service in Virginia and West Virginia, NS put the performance of its new A.C. units under a microscope. The road then turned heads by breaking its long-standing allegiance to D.C. power with multi-year orders for GE ES44ACs and EMD SD70ACes. Four years hence, 117 additional ES44ACs and 100 SD70ACes have joined the roster, with more on the way.

Although A.C. locomotives still account for just 5 percent of the NS fleet, the railroad's transition from D.C. to A.C. traction was one of last blows for the conventional D.C. locomotive. The combined effect of the NS shift to A.C. power in 2008 and BNSF's transition to the ES44C4 concept in 2010 essentially eliminated the demand for the domestic D.C. product line of both builders.

While brilliantly painted heritage fleet celebrities steal the limelight, the remaining 99.5 percent of the NS fleet is also worthy of note. The largest influence on the NS fleet can be distilled to just one word: Juniata. Inherited as part of the Conrail merger in 1999, the expansive Juniata shop complex in Altoona, Pa., was at first treated with cautious intent. That changed quickly as NS realized the facility's tremendous capabilities. From regular overhauls to contract construction for EMD, RailPower, GE, and others, Juniata is a one-stop shop and one of the few "megashops" left on any Class I.

However, Juniata's biggest claim to fame is its homegrown approach to locomotive modernization. NS has developed new technological solutions for class after class of locomotives. In 2013, Juniata will complete the last of a 57-unit fleet of SD50E locomotives built from the core of NS and Conrail SD50s. Extensively reworked, the 6300-series has taken ownership of helper assignments over the Alleghenies and work train service system-wide, relegating dozens of SD40-2s into yard and local service.

Nickel Plate-painted ES44AC No. 8100 is bracketed by two other NS heritage locomotives in Spencer, N.C., on July 2, 2012. Tom Danneman

Building on the success of the SD50E, NS has turned attention to its 250-strong SD60 fleet. One by one, SD60s are being retired and processed through Juniata to become SD60Es, upgraded with the latest 710 Tier 2 engine, modified cooling, crashworthiness improvements, and a bold new NS-designed wide-nose cab. With an eye to the future, NS has bolstered is own SD60 fleet with purchases of secondhand units. The program, already approaching 50 units, is expected to continue through 2019.

Though demoted from premier assignments, SD40-2s abound, some 435 of them. NS has reworked dozens of the classics, eliminating the high noses preferred by both N&W and Southern, adding new "Admiral" cabs, and flipping the control stands for short-hood lead configuration. Similarly, large numbers of the GP38-2, GP40-2, and now GP59 fleets have been upgraded.

From high-hood elimination, cab upgrades, and improved crashworthiness to slug/mother conversions, NS has a plan for each of its medium-horsepower models. It seems there's nothing that Juniata won't tackle: MP15Es with AR10 alternators and new cooling systems, GP38ACs rebuilt as ECO 710-powered GP22ECOs, scores of slugs and remote-control platforms, and new research cars … and don't forget NS 999, the onetime EMD GP38 now equipped with more than 800 batteries!

Juniata is also home to the NS business train fleet including its celebrated quartet of EMD F units. With amazing regularity, office car specials powered by the Fs in classic A-B-B-A formation depart Altoona for points across the system. NS has continued to improve the EMD streamliners, with upgraded 645-series engines and AR10 alternators, rewired control systems, and the latest air brake and cab signaling equipment. This bodes well for three new arrivals, two F7As and an F7B purchased by NS in early 2013. We can only hope they're in line for a trip through Juniata.

Projects like the F units display the love for railroading that the NS culture exudes, from laborers all the way to its highest executives. From Pennsy pinstripes on a modern Evolution to the classic lines of its bulldog-nosed F7s, and a newly revived steam program, NS has successfully promoted modern locomotive technology without losing its appreciation of the history that has made it one of the nation's most successful railroads.

Getting scarce: high-hood SD40-2 No. 3324 at Fostoria, Ohio. Greg McDonnell

Fast facts

- **The NS fleet includes 269 EMDs with high short hoods, including 4 former N&W GP38ACs, 22 ex-Southern SD40-2s, and 243 former Southern GP38-2s.**
- **Two prototypes for Dash 8 rebuilds have been done, one with an Admiral cab.**
- **The NS executive fleet is composed of an A-B-B-A set of EMD Fs rebuilt to F9 specifications and further upgraded.**

CANADIAN NATIONAL BACK TO THE FUTURE

CN GP9s drift down Byron Hill on the former Wisconsin Central south of Fond du Lac, Wis., in August 2012.

Total fleet size	2,008
Six-axle vs. four-axle by percentage	C-C: 71%, B-B: 29%
A.C. vs. D.C. by percentage	A.C.: 2%, D.C.: 98%
Builders by percentage	EMD: 67%, GE: 32%, Other: 1%
Model count	34
Top five models	GP38-2: 246
	Dash 9-44CW: 216
	SD70M-2: 190
	SD75I: 172
	GP9: 126
Percentage of top 5 models vs. total	47%
Percentage 4,000 hp and higher	53%
Percentage by type:	
Switcher/genset	2.5%
Slug	4.0%
EMD GP	22.5%
EMD SD (less than 3,500 hp)	10.1%
EMD SD (greater than 3,500 hp)	28.7%
EMD MAC	0
EMD ACe	0
GE Dash 8/Dash 9	23.9%
GE AC4400CW/AC6000CW	0
GE Evolution	8.0%
Other/special	0.4%
Average age	21.2 years

Background photos by Tom Danneman and Drew Halverson

Has anyone seen the DeLorean? CN's recent motive power philosophy seems to be straight out of the 1985 movie "Back to the Future," rocketing train-watchers back in time. Not to the movie's 1955 setting but instead to, say, 1990 and a time when high-horsepower, D.C.-traction locomotives were the order of the day. However, it's anything but whimsy, this mix of operational requirements and "out-of-the-box" solutions.

As BNSF and UP updated their fleets and sent several hundred well-worn GE Dash 8s and EMD SD60s into retirement, CN heard opportunity knocking. Unlike neighboring CP, CN's routes have few significant grades, enabling the road to avoid the expense of A.C.-traction locomotives

CN SD75I No. 5780 at Duplainville, Wis. Two photos, Tom Danneman

Three brand-new CN ES44ACs lead coal empties through Azouzetta, British Columbia, in March 2013. Jeff Robertson

when lower-cost D.C. power would readily fit the bill. CN jumped at the chance to grab hand-me-down high-horsepower D.C. locomotives at bargain basement prices.

Between 2010 and 2012, CN amassed a fleet of 102 used Dash 8s from UP and BNSF, plus 43 former Oakway SD60s that had begun life as leasers on BN. When CN ordered new locomotives in 2012, it also worked with the builders to source more used power, picking up 42 Dash 8-40Cs built for Chicago & North Western and 47 more former Oakway SD60s. CN is expected to overhaul and upgrade these locomotives to the latest fleet standards, including fresh paint, at a cost dramatically lower than the price of new motive power.

While ruggedly efficient, CN's fleet retains its trademark flair for the unusual. Rarest of all are 20 GMD1s built between 1958 and 1960 and upgraded in the 1980s. London, Ont., shops built 101 of the boxy, 1,200-hp road-switchers in A1A-A1A and B-B versions. Only 18 were constructed as four-axle, but CN ultimately converted the entire fleet to B-B. CN also remains the largest Class I operator of GP9s, with 126 employed in secondary and yard service across the system.

A legacy of its romance with full-cowl locomotives, a design feature mandated on all CN units built between 1982 and 1993, 81 Dash 8-40CMs and 62 SD60Fs remain on the roster. Included are 26 Dash 8-40CMs inherited in the BC Rail merger.

The last Class I railroad holdout on D.C. traction, CN may well have made history in December 2010 when EMD London delivered the road's latest SD70M-2 order. By all indications, CN 8964 could stand as the last new-production, high-horsepower D.C. locomotive built in North America.

CN finally embraced A.C. power in 2012, placing orders for 35 GE ES44ACs and 30 EMD SD70ACes. The GEs arrived by early 2013 and were pressed into heavy-haul coal service in western Canada. The SD70ACe order, which would have been the first production units to be equipped with individual-axle traction control, is reported to have been canceled in favor of an additional 30 ES44ACs.

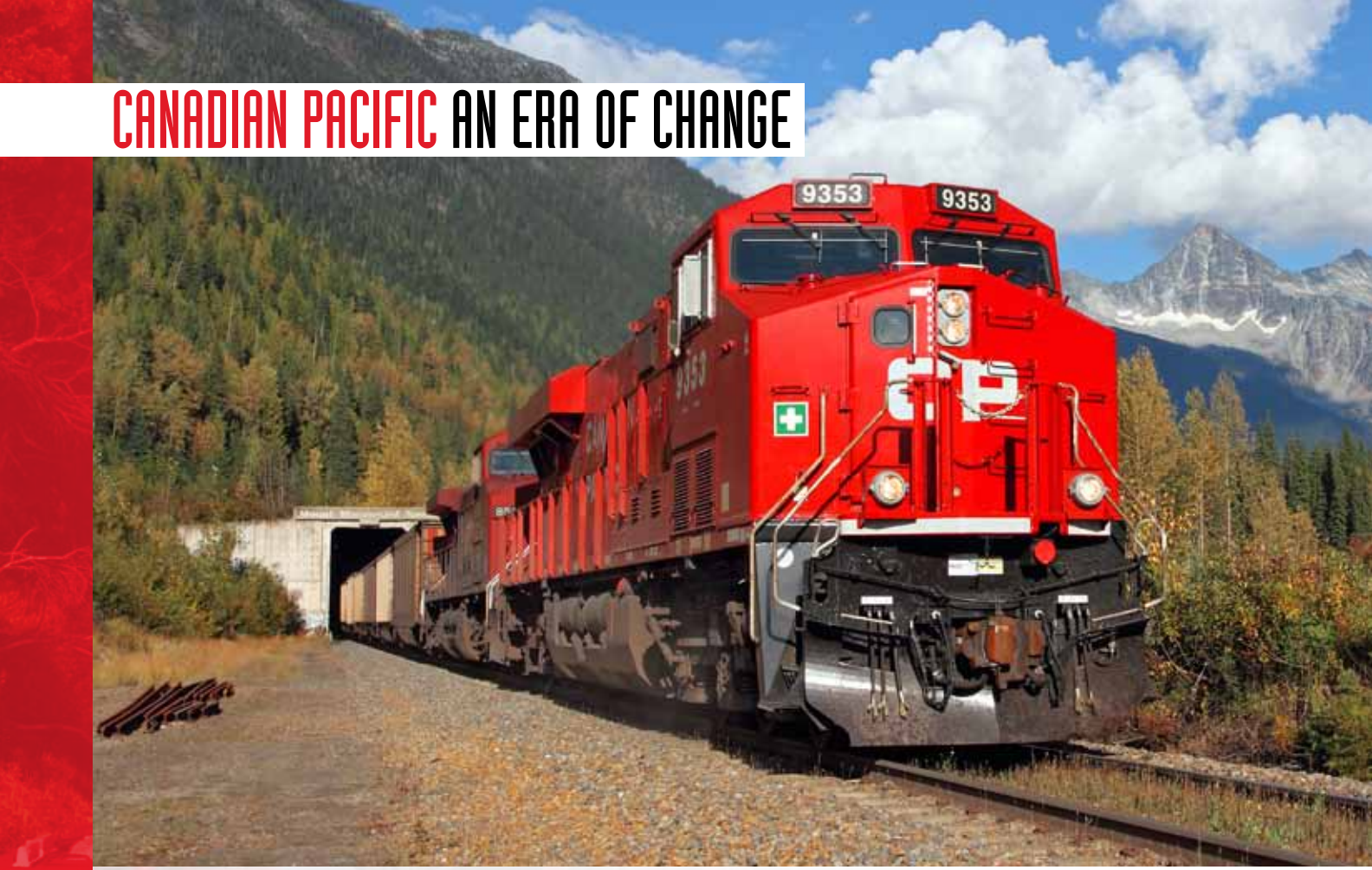
CN employs its eclectic mix of locomotives with perhaps the greatest efficiency of any North American fleet. Whether A.C. units for the future, or "back to the future" with old school high-horsepower D.C. units, CN will be a motive power movie we'll continue to watch for years to come.

CN's 143 cowls include 26 inherited BC Rail Dash 8-40CMs. Drew Halverson

Fast facts

- The last D.C.? CN No. 8964, an SD70M-2 delivered in December 2010 could be it!
- CN has 4 ex-Burlington Northern E9As for executive service (2 lettered CN, 2 Illinois Central), and 3 ex-Amtrak F40PHs for Algoma Central passenger service.
- CN is the largest operator of SD70M-2s in North America.

CANADIAN PACIFIC AN ERA OF CHANGE



Total fleet size	1,639
Six-axle vs. four-axle by percentage	C-C: 76%, B-B: 24%
A.C. vs. D.C. by percentage	A.C.: 50%, D.C.: 50%
Builders by percentage	EMD: 53%, GE: 46%
Model count	29
Top five models	AC4400CW: 478
	SD40-2: 302
	ES44AC: 291
	GP38-2: 189
	GP9: 76
Percentage of top 5 models vs. total	82%
Percentage 4,000 hp and higher	50%
Percentage by type:	
Switcher/genset	1.8%
Slug	0.4%
EMD GP	21.7%
EMD SD (less than 3,500 hp)	22.8%
EMD SD (greater than 3,500 hp)	2.6%
EMD MAC	3.5%
EMD ACe	0
GE Dash 8/Dash 9	0
GE AC4400CW/AC6000CW	29.2%
GE Evolution	17.8%
Other/special	0.3%
Average age	20.8

Background photo by Drew Halverson

The May 2012 announcement that E. Hunter Harrison would join CP as president and CEO triggered a fury of speculation. How would CP change in the aftermath of a vicious and public power struggle? The wait was brief. The new management instituted a modified operating plan that touched every aspect of operations. CP launched new services, slashed yard and local activities, and gave train schedules a massive overhaul. The impact on the locomotive fleet was no less subtle.

Harrison proclaimed no need for new road locomotives before 2016, making the most recent delivery of 30 GE ES44ACs perhaps the last big power to arrive for some time. However, with the addition of those ES44ACs in early 2012, CP's GE fleet accounts for nearly 50 percent of its total locomotive roster. From coal to the fastest cross-country intermodal service, the 769 AC4400CW and ES44AC locomotives make up the backbone of today's CP fleet.

CP's 15-year old SD90MAC "Convertibles," once pitted head-to-head against rival GE AC4400CWs, have been excluded from the road's long-term fleet strategy. Traditionally among the first locomotives to be stored during traffic downturns and the last to be re-activated, the 58 MACs saw one last revival in 2012 before being permanently tied up and offered for sale.

CP has likewise dispatched the rainbow-

ES44AC No. 9353 and an AC4400CW exit the Mount MacDonald Tunnel with an eastbound coal train. Six-motor GE A.C. units account for 46 percent of CP's fleet. Mike Danneman

hued lease-fleet SD40-2s that had been a fixture on the road for years. The vagabond lot from Helm, CIT, and NRE were furloughed in the Harrison operating plan, and were sent packing in 2012.

With the elimination of hump activity at four yards and the rationalization of yard and local jobs, several dozen aging switchers, slugs, and unusual "hump controller" units have been retired in the past year. Casualties also included the road's two NRE 3GS21B-DE gensets. While CP still rosters 29 locomotive models, just five make up 82 percent of its fleet. Watch for more rarities to see retirement soon.

The EMD/Progress Rail contract to revitalize CP's GP and SD fleet remains green-lighted by Harrison. Aging GP7 and GP9s, many past their 60th birthday, are being sent to scrap, with their components incorporated into GP20C-ECO locomotives at Progress Rail's Muncie, Ind., plant. Rolling out as 2200-series units, the 8–710G3A–T2 powered ECOs are the modern-day, fuel-efficient equivalent to the GP38-2. Thirty were placed in service at St. Paul, Minn., in late 2012 and early 2013. CP has ordered 40 more GP20C-ECOs for 2013 and is expected to follow through on plans for 150 of the new-age Geeps.

The sun sets on CP Geeps at Galt, Ont., and on CP's entire fleet of GP7s and GP9s; 30 GP20C-ECOs have arrived, and 40 more are on order. Greg McDonnell

Less certain are plans for the SD40-2 ECO upgrades. Progress Rail's Mayfield, Ky., shop has transformed 20 SD40-2 cores into 710-powered SD30-ECOs, but CP has yet to exercise its option for more. For the moment, CP's 300-plus SD40-2s (including more than 100 Dakota, Minnesota & Eastern/Iowa, Chicago & Eastern units) are second only to AC4400CWs in the fleet, a ranking they're likely to hold for a while.

The only Class I road without a heavy locomotive repair shop of its own, CP has begun contracting out long-overdue overhauls of its aging GP38-2s, SD60s, and SD60Ms, many still in the factory paint applied 25 to 35 years ago. CP and Soo GP38-2s are being cycled through Progress Rail's shop in Mayfield, Ky., and NRE's plant in Silvis, Ill., while CAD Rail in Lachine, Quebec, had, until recently, been overhauling and repainting Soo SD60s and SD60Ms. Earlier this year, the program was abruptly suspended and the units stored. CP has since offered all 42 SD60s for sale or lease.

Five Canadian Pacific SD40-2s, all dressed in DM&E/IC&E blue and gold, snake their way out of Muskego Yard in Milwaukee, Wis. Drew Halverson

Fast facts

- **CP's heritage fleet includes an FP9/F9B A-B-A set for executive and Royal Canadian Pacific service, as well as one steam locomotive: 4-6-4 No. 2816.**
- **CP has made lease returns and retirements of surplus locomotives totaling more than 460 locomotives since its operational realignment in 2012.**
- **Five locomotive models account for more than 80 percent of the CP fleet.**

KANSAS CITY SOUTHERN THINKING AHEAD

KCS ES44AC No. 4801 lopes along the UP Cuero Sub near Guadalupe, Texas, in March 2013. Two photos, Mike Danneman

Total fleet size	981
Six-axle vs. four-axle by percentage	C-C: 72%, B-B: 28%
A.C. vs. D.C. by percentage	A.C.: 51%, D.C.: 49%
Builders by percentage	EMD: 69%, GE: 30%, Other: 1%
Model count	25
Top five models	ES44AC: 159 SD70ACe: 142 AC4400CW: 123 GP40-3: 89 GP38-2: 84
Percentage of top 5 models vs. total	61%
Percentage 4,000 hp and higher	51%
Percentage by type:	
Switcher/genset	7.7%
Slug	1.2%
EMD GP	19.0%
EMD SD (less than 3,500 hp)	15.8%
EMD SD (greater than 3,500 hp)	3.9%
EMD MAC	7.5%
EMD ACe	14.5%
GE Dash 8/Dash 9	1.3%
GE AC4400CW/AC6000CW	12.5%
GE Evolution	16.2%
Other/special	0.3%
Average age	21.7

Background photo by Mike Danneman

In retrospect, it all makes sense. But the industry didn't see the railway market potential of the 1994 North American Free Trade Agreement in the same way that Kansas City Southern's visionary president and CEO Mike Haverty did two decades ago as he began building a new railway empire. Through a series of seemingly unrelated negotiations, KCS formed a 6,000-mile system that stretched from south-central Mexico to Saint Louis, carving a unique niche for this once sleepy Class I. Haverty was a decade ahead of his competitors.

The same can be said for the KCS diesel fleet. While accounting for only about 3.5 percent of the Class I locomotive population, KCS has been on the cutting edge of motive-power technology, often championing advancements ahead of its neighbors.

For mainline power, today's KCS is an A.C.-traction railroad. Most Class I railroads continued to purchase at least some D.C.-traction locomotives until recent years, with CN and BNSF doing so until 2010. Even big A.C. players like UP and CSX took delivery of D.C. units as late as 2004 and 2007, respectively. KCS and its Mexican counterpart, Kansas City Southern de Mexico, haven't purchased a new D.C. locomotive since the last order of EMD SD60s in 1991. From 1997 on, KCS and KCSM (formerly TFM) have gone A.C. all the way. The combined roads have

amassed a fleet of 123 AC4400CWs, 75 SD70MACs, 142 SD70ACes, and 159 ES44ACs that now account for essentially one half of the roster. No other North American road boasts such a high percentage of A.C.-traction power.

The big A.C. locomotives are assigned to heavy coal, grain, and freight trains systemwide. The older SD70MACs have cascaded into general freight service, replacing D.C. locomotives that were demoted or eliminated altogether. By mid-2013, KCS/KCSM had significantly reduced its SD40-2 and SD50 fleets, many of which are in long-term storage or work-train service. Dozens have been retired, with most going to dealers such as Larry's Truck Electric for parts harvest and scrap. Some of the newer SD60s have been dispatched to Mexico; others are stored. Unlike other Class I roads that have held onto their SD40-2s, KCS appears to be the first headed toward a locomotive fleet without them.

The light infrastructure on many KCS routes requires the use of four-axle power. Bolstered with secondhand purchases over the last decade, KCS has made strides to modernize this growing fleet. While today's medium-horsepower fleet consists mainly of GP38-2s and GP40-2s, the mechanical department has made efforts to install microprocessors on many of these EMDs, upgrading them to Dash 3 specifications.

In 2009, KCS/KCSM became the first major customer for EMD's ECO-repower concept, rehabilitating at least 24 GPs and two SDs. Rebuilt by EMD in London, Ont., MotivePower Inc. in Boise, Idaho, and in the road's own shop in Shreveport, La., the EMD ECOs are employed in a variety of secondary services on KCS and KCSM lines.

From Kansas City to New Orleans to the Mexican ports of Lázaro Cárdenas and Veracruz, KCS remains a step ahead of its competitors in implementing a new approach to north-south railroading. When it comes to looks, KCS is arguably leagues ahead. Decked out in a dazzling rendition of the road's classic *Southern Belle* livery revived by Haverty in 2007, KCS and KCSM's A.C. units, Dash 3s, and ECOs — not to mention the A-B-A set of F9s assigned to office car trains and specials — are among the best-dressed locomotives anywhere.

Crossing the Colorado River bridge at Wharton, Texas, GP40-3s 2800 and 2951 run light back to Kendleton Yard after delivering cars to Edna.

Fast facts

- KCS has not purchased a D.C.-traction locomotive in more than two decades.
- First class: FP9/F9B A-B-A with Dash 3 upgrades and *Southern Belle* paint.
- With 51 percent of its fleet A.C., KCS ranks highest among all Class I railroads.

AMTRAK CHANGE HAS BEGUN

Dashing through the snow, P42DC No. 145 leads Amtrak No. 5, the *California Zephyr*, at Crescent, Colo. Mike Danneman

Total fleet size	419*
Six-axle vs. four-axle by percentage	B-B: 100%
A.C. vs. D.C. by percentage	A.C.: 11%, D.C.: 89%
Builders by percentage	GE: 64%, EMD: 25%, Other: 11%
Model count	17
Top five models	P42DC: 205
	AEM-7: 51
	Dash 8-40BPH: 29
	F59PHI: 21
	Tied, Dash 8-32BWH and P32AC-DM: 18
Percentage of top 5 models vs. total	82%
Percentage 4,000 hp and higher	72%
Percentage by type:	
Switcher/genset	14.8%
Electric	15.8%
EMD F59PHI	5%
GE Dash 8	4.3%
GE GENESIS	60.1%
Average age	17.8 years

*** Fleet total includes stored units, but excludes non-Amtrak units used in North Carolina and in California's state-financed *San Joaquin* services. Average age does not include switchers.**

Since February 2010, Amtrak has regularly issued a Fleet Strategy report aimed at providing a "living document, to serve as the cornerstone for future planning." The latest version, released on March 29, 2012, provides an overview of the current fleet and Amtrak's vision of the next 30 years.

A significant portion of the report deals with trainsets and new passenger equipment, but some of the 82 pages also focuses on locomotives. As of Dec. 1, 2011, Amtrak's locomotive fleet totaled approximately 419 diesels, electrics, and switchers, a figure that accounts for 35 percent of the

Staples of the NEC, Acela and AEM-7 meet at Trenton, N.J.

Background photo by Mike Danneman

Amtrak 454, one of 21 F59PHIs assigned to *Pacific Surfliner* services, calls at San Clemente, Calif. Two photos, Greg McDonnell

passenger locomotives in North America. As of the release date, Amtrak counted 396 units in its active fleet with 328 (excluding shop counts) regularly available for service. Peak requirements call for 281 locomotives.

By the numbers, Amtrak's current fleet seems to readily meet its operating needs, but equipment age is beginning to take its toll. As of this year, the first wave of reinforcements is on the way.

On May 13, 2013, the "Amtrak Cities Sprinter" ACS-64 electric locomotive made its public debut. With great fanfare, Siemens rolled out the first three of 70 8,600-hp ACS-64s that will allow Amtrak to replace its current 62-unit AEM-7 and HHP-8 active electric fleet. The $466 million order should be completed by 2016.

Amtrak's AEM-7s, workhorses of the Northeast Corridor, are now a quarter-century old and have racked up an average of 4 million miles apiece. Despite rehabilitation programs and conversion of many to A.C. traction, the AEM-7s are ready for a well-earned retirement. The HHP-8s are a generation younger, but reliability issues have held them to just over a million miles each. The new Siemens locomotives will replace both classes and provide a uniform electric locomotive fleet on the Northeast and Keystone corridors.

The diesel fleet is the next likely target. Of the 334 diesels in Amtrak's active fleet, some 228 are GE "Genesis" locomotives in three configurations: the original 800-series Dash 8-40BPs, 18 dual-mode P32AC-DM diesel-electric/electrics employed in New York-based Empire Services, and the ubiquitous P42DC. With an average of more than 2 million miles under their belt, the Vergara-styled GEs are showing their age. Rounding out the fleet are 21 well-worn F59PHIs in California *Surfliner* service, 18 Dash 8-32BWHs (now mostly in switching duty), and 45 switchers, some of which date back more than 60 years. Other than a few recent genset purchases, Amtrak's newest diesels are 12 years old.

Of course the question is what locomotives, and when? While Amtrak would like to initiate diesel purchases now, it remains committed to passenger-car and electric-locomotive projects first. And despite its desire to begin replacement as early as 2016, no money has yet been budgeted for diesels and no request for bid released. T

Decked out in Amtrak's "Phase I" heritage livery, P42DC No. 156 hustles train No. 7, the *Empire Builder,* through Brookfield, Wis. Drew Halverson

Fast facts

- **Amtrak's 419 units account for 35 percent of North American passenger power.**
- **Amtrak is the largest user of carbody-style locomotives in North America.**
- **Amtrak is the second-largest user of electric locomotives; NJ Transit is No. 1.**

Made in Mu

ncie

Progress Rail's new Muncie plant has built more than 175 engines for seven countries in two years time. How do they do it?

by Greg McDonnell

Water jets blast Penn Central-painted Norfolk Southern 1073 as the newly completed SD70ACe undergoes pre-delivery tests at Progress Rail Manufacturing's locomotive plant in Muncie, Ind. NS: Casey Thomason

Man of steel: Sparks fly as a worker grinds welds on the mainframe of an EMD GT38AC being built for PTKA in Indonesia. Greg McDonnell

Painters put the finishing touches on Jersey Central-painted NS SD70ACe No. 1071 on June 21, 2012. All 10 SD70ACes in Norfolk Southern's celebrated heritage fleet were built and painted at Muncie. NS: Casey Thomason

Illinois Terminal green adorns NS SD70ACe No. 1072 in the Muncie paint booth in June 2012. NS: Casey Thomason

Two years ago Caterpillar subsidiary Progress Rail Manufacturing Corp. began building EMD-branded locomotives in Muncie, Ind. The 750,000-square-foot Muncie facility, a one-time transformer factory operated by Westinghouse, and later ABB, had been dormant for more than a decade when Progress announced its lease of the 300-acre site in October 2010. By January 2011, work to turn the long-vacant factory into a state-of-the-art locomotive assembly plant was well underway. Just 10 months later — a remarkable feat by any standards — the first Muncie-built locomotive, Ferromex SD70ACe No. 4092, made its debut in a spectacular show of laser lights, billowing clouds of dry ice, blaring air horns, bell ringing, and heavy metal music on Oct. 28, 2011.

More than 175 EMD locomotives have followed Ferromex 4092 off the Muncie assembly lines, destined for service in the United States, Canada, and Mexico, as well as Australia, Indonesia, Saudi Arabia, Mauritania in West Africa, and Gabon in Central Africa. Muncie workers have produced a full spectrum of the EMD catalog, from narrow-gauge GT38ACs for PTKA in Indonesia, to GP20C-ECOs for Canadian Pacific, and heritage-painted SD70ACes for Norfolk Southern. The Indiana plant is also on track to produce EMD's new F125 Spirit passenger locomotive.

Since 2010, EMD has been a wholly owned subsidiary of Progress Rail Services, which, in turn, is a wholly owned subsidiary of Caterpillar Inc. With the closure of the Electro-Motive Diesel plant in London, Ontario, the Progress facility in Muncie is now the primary producer of EMD locomotives. Under terms of a long-standing agreement with Bombardier, additional production (currently SD70ACes) is conducted in Ciudad Sahagún, Mexico.

Indonesian GT38ACs and GT46ACS units for Saudi Arabia fill the Muncie assembly lines. Indonesian GT38ACs are on the "B" line at right, Saudi units on the "A" line on the left. Progress Rail

From a mainframe fabrication process that includes robotic welding in the largest automated manufacturing cell in North America, to paint booths constructed to meet stringent environmental standards, to an on-site, 1.5-mile oval test track boasting a 35 mph maximum speed limit, Muncie is a model of manufacturing efficiency.

Two decades after Metra F40PHM-2 No. 214 made history as the last locomotive to be completed by EMD's legendary plant in La Grange, Ill., Muncie has taken up the mantle, restoring the "Made in America" label to EMD locomotives.

>> See more "Made in Muncie" locomotives.
Visit www.TrainsMag.com/Locomotives

Heavy-duty SD70ACe/LCi No. 705 is one of eight built at Muncie in 2012 for Fortescue Metals Group in Australia. NS: Casey Thomason

Major components

Frame: fabricated at Muncie
Engine: EMD La Grange
Main alternator: EMD La Grange
Electrical cabinet: EMD La Grange
Trucks: assembled at Muncie
Traction motors: San Luis Potosí
Cab: structure from supplier, assembled and equipped at Muncie

Locomotive assembly, step by step

1 Upside down in "Station 2," mainframe for Indonesia-bound PTKA GT38AC is outfitted with end plates, draft gear, and other components. **2** Welders work on an SD70ACS frame in the Station 3 trunnion. Process includes rotational robotic welding in this, the largest automated manufacturing cell in North America. **3** In Station 4, workers use air lines and compressed air to test newly installed air-brake systems on the mainframe of an Etihad Rail SD70ACS. **4** In final assembly "Position 1," a worker installs cabling on the mainframe of a PTKA GT38AC. Above-deck wiring and appliances, short nose, and electrical equipment locker are installed here. **5** Nose assembly for Etihad Rail SD70ACS is ready for installation. **6** Rear-hood sections; complete with radiators, cooling fans, and dynamic brake equipment; arrive as pre-assembled components. This one is ready to be placed on an Etihad Rail SD70ACS. Six photos, Greg McDonnell

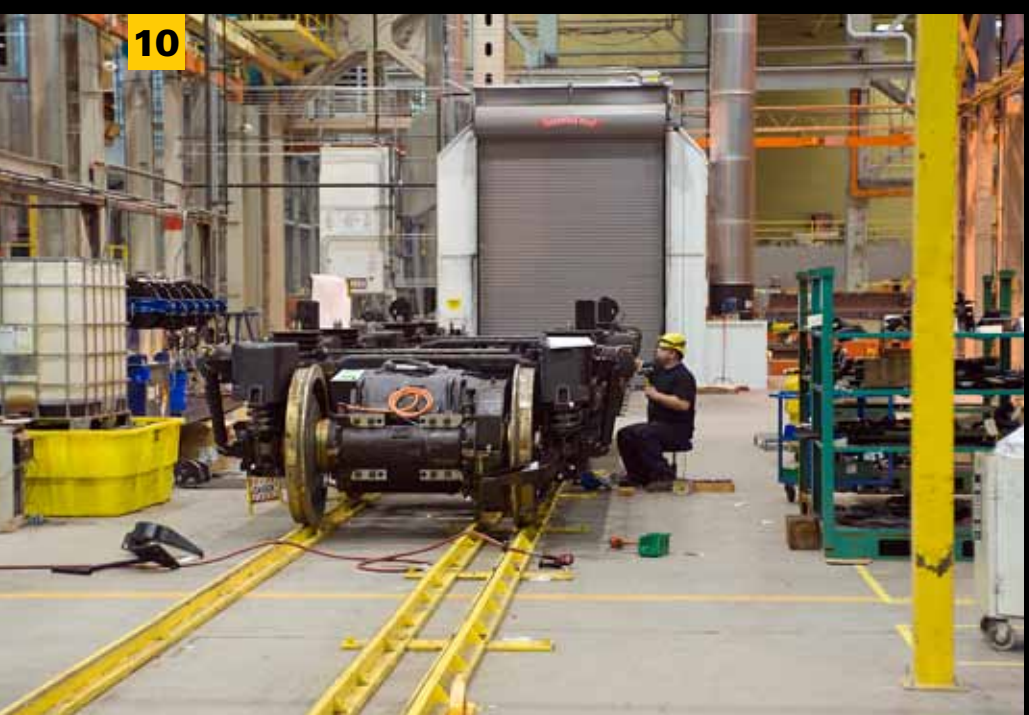
Frame fabrication

Station 1: Mainframe fabrication consists of bedplate, side sills, and cross members. The unit is right-side up at Station 1, and then flipped upside down through the rest of the underframe process.

Station 2: Mainframes are outfitted with end plates and draft gear, as well as pivot pins and other small welded components.

Station 3: Rotational robotic welding conducted on trunnion. All structural welding is complete after this operation.

Station 4: Underframe equipping, wiring, and air piping installed. The locomotive moves to the assembly line.



7 Etihad Rail SD70ACS No. 45002 (left) and an SD70ACe/LCi for BHP in Australia on the assembly lines.
8 Riding on air-float jack pads, a narrow-gauge GT38AC destined for PTKA in Indonesia nears completion.
9 Lowered onto its trucks, an Etihad Rail SD70ACS nears completion in Position 5. The small turntable in the foreground is used to turn completed truck assemblies. At right is a PTKA GT38AC; in the background, a completed BHP SD70ACe/LCi.
10 Worker completes an HTCR truck assembly for an SD70. Truck components: frames, traction motors, and wheel sets are manufactured by suppliers and assembled at Muncie.
11 Completed and painted in primer, an SD70 truck awaits transfer to the assembly line.
12 Ready for the road, a PTKA GT38AC is secured to a flatcar for delivery to an East Coast port where it will be loaded aboard a ship for the long journey to Indonesia.
Six photos, Greg McDonnell

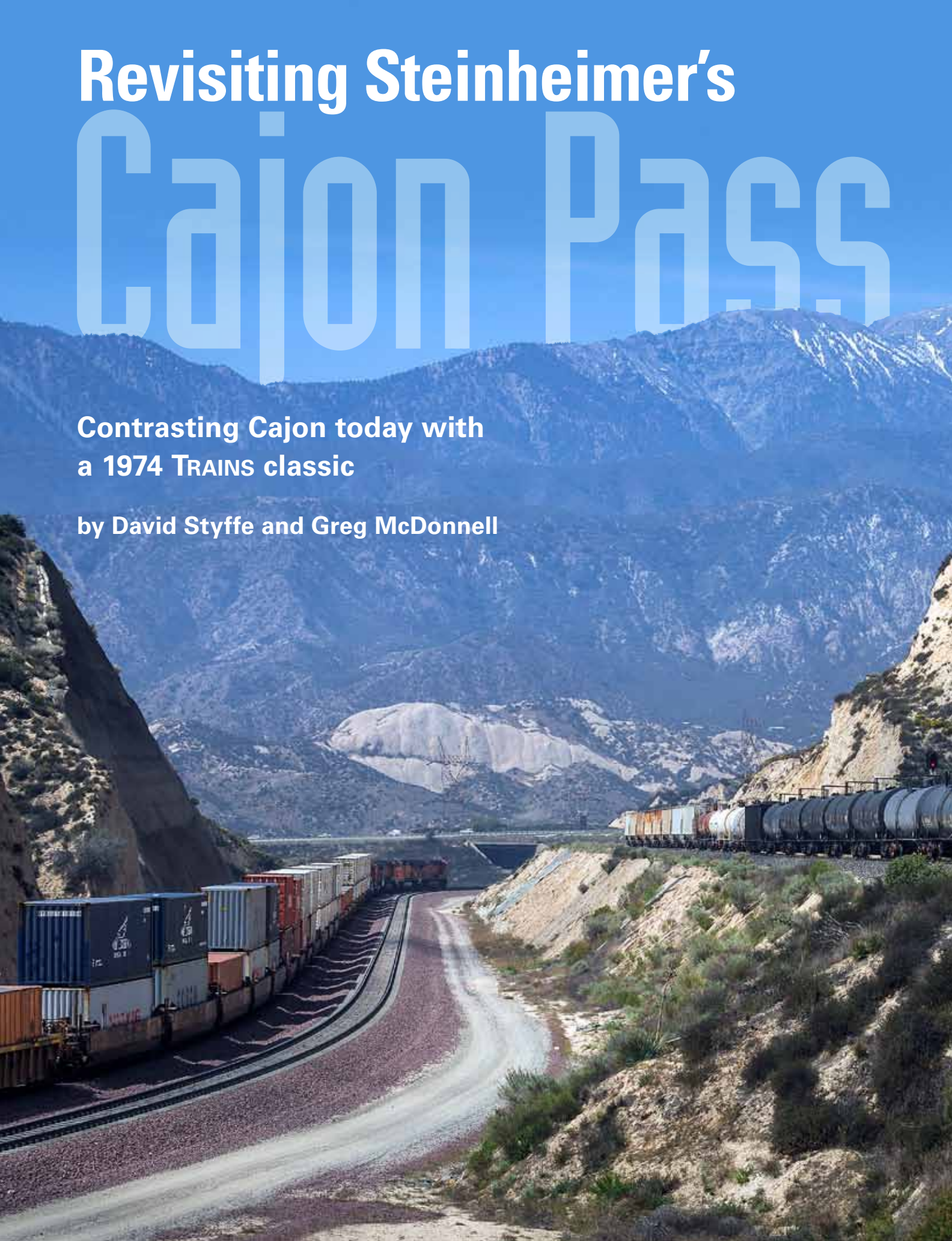
Final assembly

Position 1: Above-deck wiring and appliances, short nose, and electrical equipment locker installed.
Position 2: Cab, engine, and main alternator added.
Position 3: Engine connected to EQ rack; pre-assembled hood complete with radiators and cooling system placed.
Position 4: Partition walls, engine hood, and other work completed.
Position 5: Locomotive lowered onto completed trucks. Locomotive is moved to painting area for pre-wash and painting.
Final test: All control systems are tested, including EM2000 electronics and notch-8 m.u. test. Testing includes several laps on 1.5-mile oval test track behind plant.

Revisiting Steinheimer's Cajon Pass

Contrasting Cajon today with a 1974 TRAINS classic

by David Styffe and Greg McDonnell



Action at Alray: Westbound BNSF double-stacks ease downgrade on the Cajon Sub as Union Pacific's "Mojave Flyer" works uphill on the former Southern Pacific Palmdale Cutoff on April 5, 2013. See pages 58-59 for more. David Styffe

View from the Land Cruiser pacing a Santa Fe eastbound along Cajon Boulevard in 1973. "SD45s are really roaring," Stein wrote on the back of the 8x10 print for his September 1974 TRAINS feature "Cajon Pass Revisted." Richard Steinheimer

Stein (above) on Cajon in March 1985. At right, a through-the-windshield view of a running meet on old Route 66. "As our SD45s near Devore, they meet a westbound at Cajon Boulevard." Above, Shirley Burman; right, Richard Steinheimer

David Styffe aims a camera out the window as we keep pace with Texas-built BNSF 7107 on the steady grind toward Verdemont. I think of Stein every time I make the drive up Cajon Boulevard. Greg McDonnell

"And like magic, we're onto Cajon Boulevard with nearly 6 miles of side-by-side running ahead of us."

— Richard Steinheimer, "Cajon Pass Revisited," September 1974 Trains.

A brand-new BNSF ES44C4 runs alongside the car as David Styffe and I pace eastbound stack train S-LBACLO1-04K up Cajon Boulevard on the outskirts of San Bernardino, Calif. With our windows wide open, we're overwhelmed by a tidal wave of sound: the guttural four-cycle vocals of GE prime movers, the unmistakable whirr of A.C.-traction motors, and the high-pitched squeal of 43-inch wheels clawing at 141-pound rail.

Just weeks out of GE's new factory in Fort Worth, Texas, BNSF No. 7107, sister C4s Nos. 7008 and 6868, and Dash 9-44CW No. 4311 dig in on the 2.2-percent ascent to Cajon Pass. Double-stacks trail off in the rearview mirror, stretching as far as the eye can see. Somewhere beyond, two more GEs are shoving hard on the rear of the train.

An exhilarating, if slow-speed ride, we roll along a four-lane remnant of old Route 66, running neck and neck with 17,600 GE horses. Styffe aims a camera out the window as we keep pace with Texas-built 7107 on the steady grind toward Verdemont.

Any attempt to converse is lost in the roar. And for a moment, my mind wanders to Steinheimer's story in the September 1974 issue of Trains. He wrote his account of following an eastbound Santa Fe manifest along this same stretch of highway. Monochromatic images of SD45 No. 5511,

Faded and weatherbeaten, but still heralding Uncle John's legacy, an old Santa Fe sign clings to an overpass on the original line, now designated by BNSF as Main 3. Greg McDonnell

Headed for the Tehachapis with a northbound freight, UP ES44AC No. 5384 passes aging Southern Pacific-era searchlight signals as it exits the siding at Dike under a rising full moon on March 7, 2012. David Styffe

Boulevard of dreams: Surviving segments of old Route 66, John Steinbeck's fabled "Mother Road," follow the Santa Fe into Cajon Pass. Greg McDonnell

framed in the passenger-side window of Stein's faithful Land Cruiser, and a through-the-windshield view of a running meet on the overpass approaching Devore flash through my head. I hear Stein's voice, "Shoot all the pan shots you wish while I keep the Toyota rolling along."

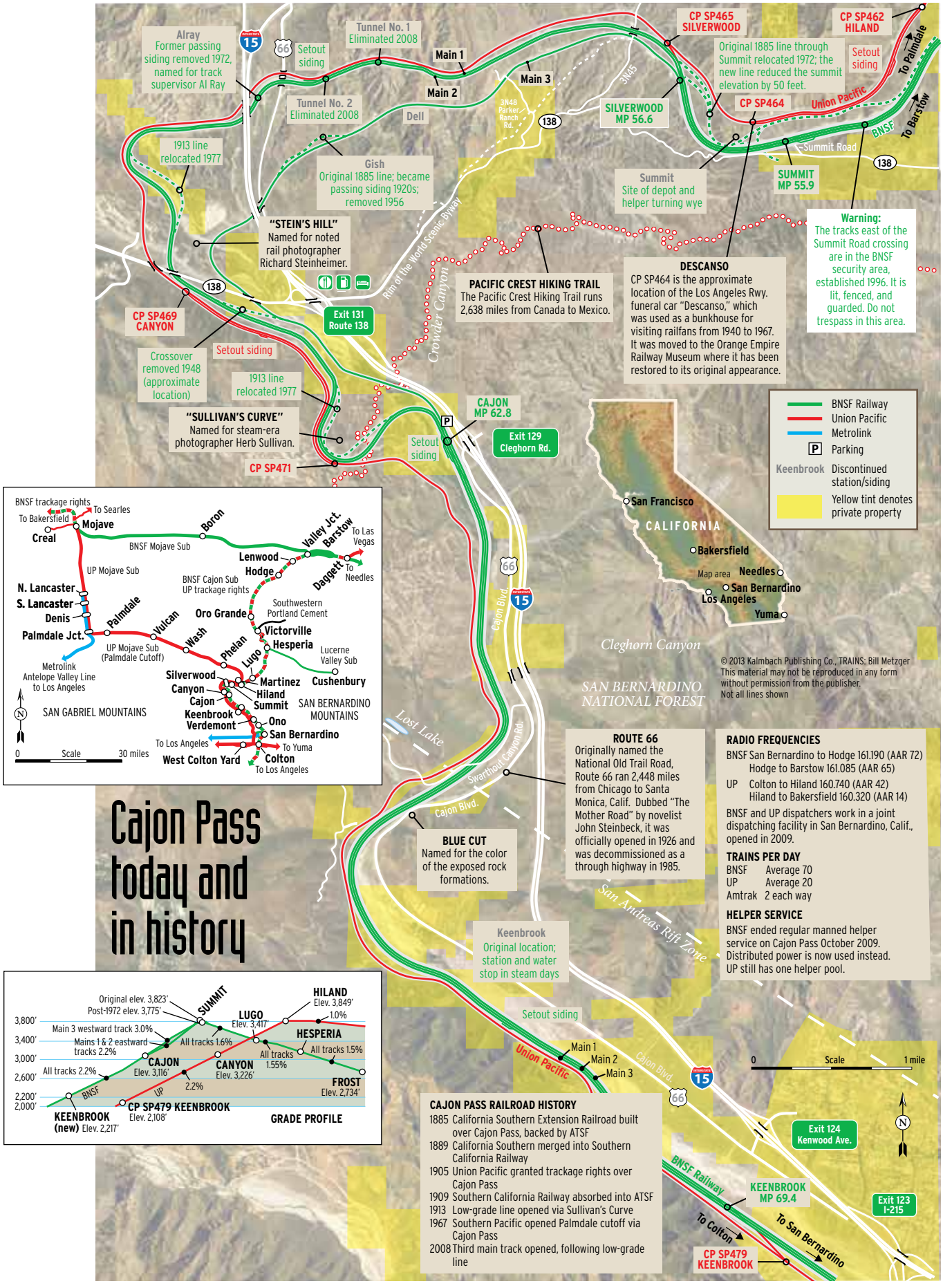
It's not the first time this has happened. I think of Stein every time I make the drive up Cajon Boulevard. If you're familiar with "Cajon Pass Revisited," I'll wager you know exactly what I mean.

As much a gifted storyteller as he was a photographer, Steinheimer crafted a compelling photo essay that captured the quintessence of Cajon. The article was a bouncing, action-packed, conversation-filled ride with Stein at the wheel of his Land Cruiser. It was the next best thing to riding shotgun on one of his photographic expeditions, with the space between trains filled with lessons in history and geography, tributes to early photographers who'd worked the Pass (Lucius Beebe, Charles Clegg, Herb Sullivan, and H. L. Kelso), and reminiscence of Stein's youthful steam-era trips to San Bernardino, Cajon Station, and Summit. At the end of those 18 pages, the only part missing was the dust in your hair and a seat at Lee's Restaurant at the Chevron Station on Seventh Street in Victorville.

Forty years have passed since Steinheimer prowled the pass in his Toyota 4x4, splashing through Cajon Creek, setting up with his trusty Bronica at Sullivan's Curve, and staking out "Stein's Hill" to make photographs for the TRAINS essay. The SD45s and F45s, U33Cs, U36Cs, and monstrous double-engined U50Cs, DD35s, and DDA40X "Centennials" that ruled the First District of Santa Fe's Los Angeles Division and Southern Pacific's then-new "Palmdale Cutoff" in 1973-74 have followed into history the double-headed 4-8-2s, 2-10-2s, PAs, F7s, and RSD15s of Stein's reminiscence. Searchlight signals, telegraph poles and sig-

Continued on page 59

>> Read Richard Steinheimer's 1974 TRAINS story.
Visit www.TrainsMag.com/Locomotives



Cajon Pass today and in history

"We're at Sullivan's Curve, named for the late rail photographer Herb Sullivan, who in the days before and after the war made a name for himself scouring these hills with his Graflex." On a winter 1974 afternoon, Santa Fe F45 No. 5927, SD40 No. 5003, and a half-dozen four-motor EMDs wrap around the famed horseshoe with an eastbound freight. Richard Steinheimer

Thirty nine years later, factory-fresh UP SD70ACe No. 8784 and faded AC4400CW No. 6546 ease a heavy westbound ore train around Sullivan's Curve, overtaking sister GEs working an L.A.-bound intermodal on the adjacent UP Mojave Sub. The ore train is exercising BNSF Cajon Sub trackage rights established in 1905 by UP predecessor Los Angeles, San Pedro & Salt Lake Railway. Greg McDonnell

Viewed from a vantage point that would become known as "Stein's Hill," a westbound UP freight descends Cajon, threading the S-curve west of Interstate 15 in a haze of brakeshoe smoke. Powering the East Los Angeles-bound manifest is a 14,500-hp lashup only UP could muster: trailing DD35A No. 73 are a DD35B and a pair of GP30Bs. Richard Steinheimer

Stein's Hill today: BNSF ES44C4 No. 7030 and two ES44DCs lead Barstow-San Diego freight M-BARSDG1-05A on April 5, 2013. Helping control its descent of the 3-percent grade on Main 3, the westbound has a pair of ES44DCs working as distributed-power remotes on the rear of the train. David Styffe

Alray in transition: Captured in two 1973 photos taken moments apart, a Santa Fe eastbound emerges from Tunnel 1, one of only two tunnels on Cajon, while moments later, an SP train follows on the parallel Palmdale Cutoff. Richard Steinheimer

The tunnels are gone, but the drama remains as BNSF GEs shove hard on the rear of an eastbound stack train in April 2013, putting on a performance that surely ranks as the modern-day equivalent of doubleheaded 2-10-2s. Greg McDonnell

Working on the newly opened third track, an eastbound BNSF intermodal negotiates a shoo fly around soon-to-be daylighted Tunnel 2 at Alray in March 2008. No match for the competition, a heavy UP freight labors upgrade on the old SP. Greg McDonnell

Continued from page 54

naling code lines, freight cars with friction-bearing journals, and cabooses, including the SP cabs that served as train-order offices at Dike and Hiland, also followed. Even the railroads themselves: Santa Fe merged into BNSF in 1995, and Union Pacific gobbled up SP on Sept. 11, 1996.

Traffic and tonnage over the mountain have increased exponentially, and BNSF's 4-year, $90-million campaign to triple-track its line from San Bernardino to Summit (completed in 2008) has forever altered the face of Cajon. Cuts have been widened, mountains of earth moved, and the only two tunnels on the hill (Tunnels 1 and 2 near Alray, dating from Santa Fe's construction of a second main track over Cajon in 1913) have been daylighted.

The drama, excitement, and sheer spectacle of railroading on this starkly beautiful, sometimes hostile desert mountain is unchanged. Cajon is no place for the old and infirm of dieseldom. Indeed, this busiest of all railroad mountain crossings in North America is a showcase of modern locomotive technology. Steinheimer took technological changes in stride. "Seeing four big Centennial DDA40Xs racing over the top of the hill at dawn," he wrote, "is train-watching in a league with seeing the double-headed Big Boys once found on Sherman Hill." It's a sentiment that rings just as true today. Stand on a hilltop above Silverwood at dawn and watch four trains simultaneously negotiate the mountain main lines of two railroads. Sit on the rocks at Sullivan's Curve and listen to the bark of BNSF GEs hammering upgrade and blending with the whine of UP SD70ACes dropping downgrade with an intermodal train on the Palmdale Cutoff. Dare to be unmoved as a BNSF Dash 9/C4 duo, working as radio-controlled DPUs on the rear of an eastbound stack train, struggle through Alray — shrouded in sand and blowing dust and exhaust — shout at the top of their turbocharged lungs in a performance that surely ranks as the

One man's misfortune is another's gain. A small lizard takes up residence in a broken hosebag. Greg McDonnell

Cruising through the still-new cut, part of a 1972 reconstruction that all but wiped old Summit from the face of the earth, UP DD35A No. 70, three GP30Bs, and a DD35B top Cajon with an eastbound freight. Richard Steinheimer

Racing ahead of the dawn, a trio of Amtrak SDP40Fs roll the westbound *Super Chief* through Summit on a 1973 morning. Richard Steinheimer

modern-day equivalent of doubleheaded 2-10-2 pushers slogging upgrade on the rear of a Santa Fe reefer block.

As it's been since Santa Fe first spiked rails through the pass in 1885, since Herb Sullivan hiked into the horseshoe curve that would one day bear his name to place on film the likes of high-stepping Santa Fe 4-6-2s assisting the *Chief*'s warbonneted EMDs and mammoth UP 4-10-2s helping Northerns lug trains of heavyweight coaches up the hill, and since Richard Steinheimer took the readers of TRAINS on a bouncing Land Cruiser ride over the hill, Cajon Pass today is, as Stein wrote, "a good place to watch trains."

Silverwood, the new Summit

Eleven minutes at Silverwood: Eastbound BNSF intermodals Z-SBDWSP7-10A and Z-LACNYC9-10L meet westbound UP intermodal ISCLB on May 10, 2013. Powered by a trio of SD70Ms, the UP train is on Main 3, and seems to "drop off the table like a Sandy Koufax curveball," as it takes the original 1885 main line. Four photos, David Styffe

'Yes, the passage of time changes most everything, but few places have been so completely obliterated as the old Summit at the top of Cajon Pass," wrote Chard Walker in "Train-Order Operator at Summit," September 1974 TRAINS. Summit, once the heart and soul of Cajon Pass, was all but wiped from the face of the earth in 1972 when Santa Fe conducted a 3-mile reconstruction and re-alignment project that eased wicked curvature and lowered the crest by 51 feet. Though Summit has been reduced to little more than a set of crossovers, a new, more strategic and spectacular control point has been created just around the curve to the west.

Silverwood, a control point on the BNSF Cajon Sub, as well as on the adjacent UP Mojave Sub, is a wealth of operational and visual interest. A connecting track built in 1999 links the BNSF and UP lines, enabling UP trains exercising BNSF trackage rights to move to and from the former SP Palmdale Cutoff. On BNSF, it is also the point where the 2.2-percent and 3-percent eastbound grades ease to a gentle 0.5 percent for the remaining mile to the top of the hill.

So stand with me on a hilltop at Silverwood as two eastbound trains come into view. First up on Main 1 is BNSF Z-SBDWSP7-10A, a San Bernardino-Willow Springs, Ill., intermodal in the charge of ES44C4 No. 6788, a Dash 9, and another C4. Racing up the inside on Main 2, and rapidly overtaking the 6788 East on Main 1, is the ultra-hot transcontinental Z-LACNYC9-10L with a pair of C4s sandwiching a pair of Dash 9s. Before the trailers on the end of BNSF 6788 East can clear, Union Pacific 4655 West, a Long Beach-bound intermodal with a trio of SD70Ms, comes around the curve on Main 3. Dynamic brakes howl as the EMDs hold back stacks and piggybacks on the steep descent to Cajon. Viewed through a 280mm lens, the train seems to drop off the table like a Sandy Koufax curveball veering to the left on the original main line laid down in 1885. Silverwood, think of it as the new heart of Cajon Pass. — *David Styffe, a photographer and graphic artist in Southern California*

Ed Ellis' SHOPPING SPRE'E

Iowa Pacific president preserves, runs, and keeps buying more Electro-Motive streamliners

by Steve Glischinski

In the late 1950s and early '60s, as steam locomotives ran out their last miles, F. Nelson Blount emerged as the savior of dozens of steam locomotives. As his collection grew, Blount established Steamtown USA, located in Bellows Falls, Vt. Blount died in 1967, and the collection has morphed into today's Steamtown National Historic Site in Scranton, Pa. While Blount's legend as a steam preservationist has grown, there wasn't a similar figure in diesel preservation until now. Ed Ellis and his company, Iowa Pacific Holdings, preserves and operates Electro-Motive streamliners.

Ellis, president and founder of Iowa Pacific Holdings, founded in 2001, operates nine railroads across the United States, and two short lines in Great Britain. An unabashed fan of streamlined diesels, Ellis through his railroad has acquired 25 classic EMD diesels: 16 E units, seven F units, and a pair of rare BL2 road switchers. Unlike Blount, who could only operate a handful of locomotives in his collection, Ellis intends to put all the vintage diesels his company has acquired into service.

E8 No. 518 and Saratoga & North Creek BL2 No. 52 approach Thurman, N.Y., in June 2012.

Iowa Pacific is probably best known for its passenger car fleet of more than 100 and counting, including full-length dome cars of Great Northern, Milwaukee Road, and Santa Fe heritage. Iowa Pacific also formed Pullman Rail Journeys to operate luxury passenger service in the Pullman Co. tradition on refurbished sleeper cars coupled to Amtrak's *City of New Orleans* between Chicago and the Crescent City [see "Ed Ellis: His Railroads and His Dream," June 2013 TRAINS]. While the Iowa Pacific passenger cars are in the spotlight, Ellis has quietly built a fleet of streamlined diesels that rivals any museum.

"I like E units," Ellis says. "They ought to be saved. There's only 80-something left, and some are in pretty rotten condition. The way I look at it is we are a friendly owner, and we want to get these E units back on the road."

In 2006, the company first acquired a pair of former Massachusetts Bay Transportation Authority FP10s, rebuilt from ex-Gulf, Mobile & Ohio F3s. Iowa Pacific bought former MBTA Nos. 1100 and 1114 from Classic Railcars to use on its San Luis & Rio Grande, based in Alamosa, Colo. No. 1100 was painted in a quasi-Denver & Rio Grande Western scheme, and used not only in tourist service but also pulling freights. No. 1114 has yet to see service as a result of a dispute between Iowa Pacific and a contractor.

At first, Iowa Pacific used reporting marks "SLRG" for San Luis & Rio Grande for its locomotives, but now it's formed a wholly owned subsidiary, Heritage Rail Leasing, to take ownership of the vintage diesels and passenger equipment.

More Es and two BL2s

After the pair of Fs, Iowa Pacific bought four E units and two BL2s. The four E8As once served Chicago & North Western in long-distance-passenger service, and then were converted for use on Chicago

An unlikely duo, E8 No. 518 and S&NC BL2 No. 52 cast their reflection as they cross the Sacandaga River just south of Hadley, N.Y. Two photos, Brian Plant

Climbing through La Veta Pass, San Luis & Rio Grande FP10 No. 1100 leads a passenger special at Sierra, Colo., in January 2013. Two photos, Chris Starnes

A few miles east of Alamosa, Colo., SL&RG No. 1100 accelerates an excursion train bound for the summit of La Veta Pass. Rio Grande Scenic Railroad operates summer excursions on this route with steam and diesel.

commuter trains. Successor commuter railroad Metra retired most of its former C&NW E units in the 1980s, but retained four as backups and for occasional specials. The units got back into long-distance service in June and July 1993, when Amtrak used them on flood-related detours of its *California Zephyr* on the Chicago & North Western between Chicago and Omaha, Neb. Amtrak used the Es because of their high-speed gearing and cab signaling used on the C&NW, which Amtrak's F40PHs lacked. By 1997, all four were retired and stored at National Railway Equipment in Silvis, Ill. Shortline railroad entrepreneur Clint Jones bought and resold them to Iowa Pacific in 2008 after years of storage.

Iowa Pacific sent E8 No. 515 west to Arizona Eastern for excursion service. Since Southern Pacific once owned the lines operated by Arizona Eastern, the unit was painted in a version of SP's "Black Widow" scheme and numbered 6070 to recognize SP's practice of assigning 6000-series numbers to its EMD Es and Alco PAs.

After Iowa Pacific sold Arizona Eastern to Genesee & Wyoming in 2011, No. 6070 moved east, first to New York's Saratoga & North Creek, then to the Chicago area where it headed up a weekend of dinner train excursions between Chicago and Sturtevant, Wis., in February 2012. It has since been repainted in Iowa Pacific's "default" paint scheme, the chocolate-brown-and-orange Illinois Central passenger colors, and again numbered 515. The E8 returned to Saratoga & North Creek to join the first Iowa Pacific E8 in IC colors, No. 518, released by National Railway Equipment in April 2012.

IC dreams

Ellis grew up in Paducah, Ky., and took many rides on IC passenger trains as a child, hence the attachment to IC's passenger scheme. While most of the streamlined units will wear the IC colors, Ellis says he's open to other paint schemes. "If someone

Iowa Pacific's vintage EMD fleet

No.	Model	Date built	Lineage	Location and notes
SNC 52	BL2	3/49	BAR 552, BAR 52, WICT 52, MRLX 52, SLRG 52	North Creek, N.Y., in service
SNC 56	BL2	4/49	BAR 556, BAR 56, MRAX 56, MRLX 56, SLRG 56	Metro East for work
315	F7B	10/50	CGW 112D, C&NW 112D, C&NW 315, St. Louis Car 315	Madison, Ill., needs major repair
SLRG 515	E8A	6/53	C&NW 5029B, C&NW 515, RTA 515, METX 515, AZER 6070	North Creek, N.Y., in service
SLRG 516	E8A	6/53	C&NW 5029A, C&NW 516, RTA 516, METX 516	Silvis, Ill., awaiting repair
SLRG 518	E8A	6/53	C&NW 5030A, C&NW 518, RTA 518, METX 518	North Creek, N.Y., in service
SLRG 519	E8A	7/50	C&NW 5022A, C&NW 519, RTA 519, METX 519, PRDX 519, MREX 97	To Silvis, Ill., for repair
SLRG 520	E9A	8/53	CB&Q 9972 (E8A), BN 9972, BN 9906 (upgraded 1978), MARC 66	Kansas City, Mo., awaiting repair
SLRG 521	E8A	7/51	C&NW 5023A, C&NW 521, RTA 521, METX 521	Silvis, Ill., awaiting repair
SLRG 807	E8A	11/52	PRR 5761A, PRR 4261, PC 4261, CR 4261, MBTA 4261, "DL&W" 807	North Creek, N.Y., awaiting return to service
SLRG 808	E8A	9/52	PRR 5702A, PC 4272, NJT 4272, NJT 4305, "DL&W" 808	North Creek, N.Y., awaiting return to service
SLRG 1100	FP10	12/46	GM&O 805A (F3A), MBTA 1100 (rebuilt to FP10), CCRX 1100, NCBX/HSMR 1100	Alamosa, Colo., in service
SC 1101	F9PH	1/52	B&O 939 (F7A), B&O 4582, MARC 7182 (rebuilt to F9PH), MARC 82, WCRC 82	Watsonville, Calif., in service
SC 1102	F9PH	12/48	B&O 165 (F3A), B&O 4472 , MARC 7184 (rebuilt to F9PH), MARC 84, WCRC 84	Watsonville, Calif., in service
SLRG 1114	FP10	6/47	GM&O 811A (F3A), MBTA 1114 (rebuilt to FP10), CCRX 1114	Albia, Iowa, awaiting repair
SLRG 2400	E9A	7/54	CB&Q 9991, BN 9991, BN 9921 (upgraded 1973), NYSW 2400, LTEX 2400	Hyannis, Mass., in service
SLRG 2402	E9A	12/55	CB&Q 9985A, BN 9985, BN 9915 (upgraded 1973), NYSW 2402, LTEX 2402	Hyannis, Mass., in service
SLRG 4108	E9B	7/57	IC 4108, ARR HEP-1 (rebuilt to HEP car), ARR P-30	Kansas City, Mo., awaiting repair
SLRG 6622	F9B	3/57	CN 6622, VIA 6622, CALA 6622	Alamosa, Colo., awaiting repair
SLRG 9163	F7A	10/52	CN 9116, CN 9163 (upgraded 1973) WCLR 9163, CALA 9163	Alamosa, Colo., awaiting repair
SLRG 9925	E9A	8/54	CB&Q 9995, BN 9995, BN 9925 (upgraded 1973), NERR 9925, LTEX 9925	Horicon, Wis., for paint
(BN) 9910	E9A	11/55	CB&Q 9985B, BN 9980, BN 9910 (upgraded 1973), NERR 9910, LTEX 9910	LTE MacDonald, Ohio, unserviceable, awaiting shipment
(BN) 9917	E9A	12/55	CB&Q 9987A, BN 9987, BN 9917 (upgraded 1973), NERR 9917, LTEX 9917	LTE MacDonald, Ohio, unserviceable, awaiting shipment
(BN) 9922	E9A	8/54	CB&Q 9992, BN 9992 , BN 9922 (upgraded 1973), NERR 9922, LTEX 9922	LTE MacDonald, Ohio, unserviceable, awaiting shipment
(BN) 9923	E9A	8/54	CB&Q 9993, BN 9993, BN 9923 (upgraded 1973), NERR 9923, LTEX 9923	LTE MacDonald, Ohio, unserviceable, awaiting shipment

ARR Alaska Railroad; **AZER** Arizona & Eastern; **BAR** Bangor & Aroostook; **BN** Burlington Northern; **B&O** Baltimore & Ohio; **CALA** Carolina Southern; **CB&Q** Chicago, Burlington & Quincy; **CCRX** Cape Cod Railroad; **C&NW** Chicago & North Western; **CGW** Chicago Great Western Railway; **CN** Canadian National; **CR** Conrail; **D&LW** Delaware, Lackawanna & Western; **IC** Illinois Central; **G&MO** Gulf, Mobile & Ohio; **GMRC** Green Mountain Railroad; **HSMR** Historic St. Mary's Railway; **LTEX** Larry's Truck & Electric; **MARC** Maryland Transit Administration; **MBTA** Massachusetts Bay Transportation Authority; **METX** Metra; **MRAX** Mineral Range Inc. (Clinton Jones, Jr.); **MREX** Monad Railway Equipment Co.; **MRLX** Mid America Rail Car Leasing; **NCBX** New Century Rail Transport LLC; **NERR** Nashville & Eastern; **NJT** New Jersey Transit; **NYSW** New York, Susquehanna & Western; **PRDX** Pacific Rail Dismantling Services Inc.; **PC** Penn Central; **PRR** Pennsylvania Railroad; **RTA** Regional Transportation Authority, Chicago; **SC** Santa Cruz & Monterey Bay; **SLRG** San Luis & Rio Grande; **SNC** Saratoga & North Creek; **VIA** VIA Rail Canada; **WCLR** Waccamaw Coast Line; **WCRC** Washington Central; **WICT** Wisconsin & Calumet

Departing Saratoga Springs, N.Y., with an evening train, S&NC No. 52 catches the last light of a June day. Brian Plant

The BL2, in the words of TRAINS editor David P. Morgan, "possessed an uncanny resemblance to a Borden's streamlined milk tank car." Switching at Saratoga Springs, N.Y., S&NC No. 52 shows what Morgan was talking about. Brian Plant

comes to me and asks, 'How much is it to paint a locomotive? I want to have one in my favorite road's colors,' the answer is probably around $50,000. But I'm still waiting for a check.

"If there is a reason to paint a locomotive a certain color," Ellis says, "we will." He cites the two EMD BL2s on Saratoga & North Creek, which are painted in Delaware & Hudson-inspired colors. "We did that because when we were starting up the railroad, it had been a long time since the railroad had been active, and we wanted to start some kind of a theme around it"

When Iowa Pacific began operations on its Santa Cruz & Monterey Bay out of Santa Cruz, Calif., with two ex-Washington Central F9PHs, it was just the opposite. "In Santa Cruz they wanted us to be Iowa Pacific, so there it made sense to paint the Fs in the Iowa Pacific scheme." One of the things he learned in England, Ellis says, is "The more often you repaint the locomotive the more often you get publicity for it."

The two BL2s, while technically not cab units, have a semi-streamlined carbody and are ancestors of the EMD-built Gener-

Jockeying for space with cars and bicyclists, the "Train to Christmas Town" departs Santa Cruz, Calif., on Dec. 9, 2012. Elrond Lawrence

Captured in a slow shutter-speed pan, Santa Cruz & Monterey Bay FP10 No. 1101 appears to streak through the streets of Santa Cruz, Calif., as the "Train to Christmas Town" returns to the boardwalk at dusk on Dec. 9, 2012. Elrond Lawrence

al Purpose locomotive series. EMD produced only 59 from 1947-'49, and only seven survive, counting Iowa Pacific's pair. They are originally Bangor & Aroostook units and were saved by the late Glenn F. Monhart. They operated on Ellis' Wisconsin & Calumet Railroad out of Janesville, Wis., in the 1980s and '90s. Nos. 52 and 56, built in 1949, were purchased from Clint Jones in 2008 at the same time the four C&NW E8s joined the Iowa Pacific fold.

In 2011, Iowa Pacific bought one of two cab units from the Museum of Transportation in St. Louis, former Chicago, Burlington & Quincy E8A No. 9972. The unit was BN 9972 in 1970, then was rebuilt as an E9A and renumbered BN 9906 in 1978 for Chicago commuter service. After retirement, it was sold to Maryland's commuter service MARC for further service before going to the museum. Iowa Pacific renumbered the unit 520 and sent it to Mid-America Car at Kansas City, Mo., for overhaul.

Later in 2011, Iowa Pacific acquired two ex-CN units, an F7A and an F9B from Carolina Southern, the latter also worked for VIA Rail. The units were part of a deal which included passenger cars. Iowa Pacific also purchased a former E9B from the Alaska Railroad. The unit was constructed in 1957 as Illinois Central 4108 and saw service into the Amtrak era. In 1981, Alaska Railroad bought No. 4108 and converted it to a head-end power unit and numbered it P-30. Although it currently rides on four-wheel trucks, Iowa Pacific plans to convert it back to a powered B-unit and restore its six-wheel trucks. A private owner sold Iowa Pacific Chicago & North Western E8A No. 519, built in 1950 as the 5022A. Another Metra veteran, the unit had been stored at the Arizona Railway Museum in Chandler, Ariz.

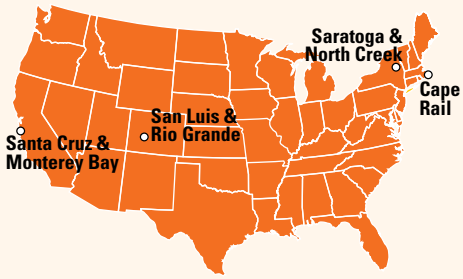
No stopping now

Iowa Pacific made even more purchases in 2012. From Larry's Truck & Electric in Ohio came three more ex-Burlington Es that once were commuter units. Nos. 2400 and 2402 had worked several years for New York, Susquehanna & Western on special trains before being retired and sold to Larry's, while ex-BN 9925 had gone to the Nashville & Eastern along with several other ex-BN Es for use on Nashville commuter trains. The units were never used in that service and were eventually sold to Larry's. Nos. 2400, 2402, and 9925 have been put back in service, with the two Susie Q units going to Massachusetts after Iowa Pacific bought a controlling interest in October 2012 in Cape Rail Inc. and its subsidiaries, the Massachusetts Coastal Railroad and Cape Cod Central Railroad.

Iowa Pacific bought two former Pennsylvania Railroad E8s, which had been repainted in Delaware, Lackawanna & Western colors, from the NRHS Central New York Chapter. The company also purchased a pair of ex-Baltimore & Ohio Fs from Washington Central. The locomotives were rebuilt for Maryland commuter service before Washington Central operated them in dinner train service. Iowa Pacific sent them to pull tourist trains on the new Santa Cruz & Monterey Bay Railway in late 2012.

Ellis has no plans to stop acquiring streamlined power. Iowa Pacific is negotiating to buy four more ex-CB&Q/BN Es, a pair of FP9s, and two F7As to add to its fleet. So far Iowa Pacific has contracted work on the units to National Railway Equipment, Mid-America Car, and RELCO, with some painting going to the Wisconsin & Southern shop in Horicon, Wis., but Ellis says that may change. "One of the things we've been talking about is the need to develop an in-house capability to do some of this work, so we are working on that," he says.

Where the E units roam



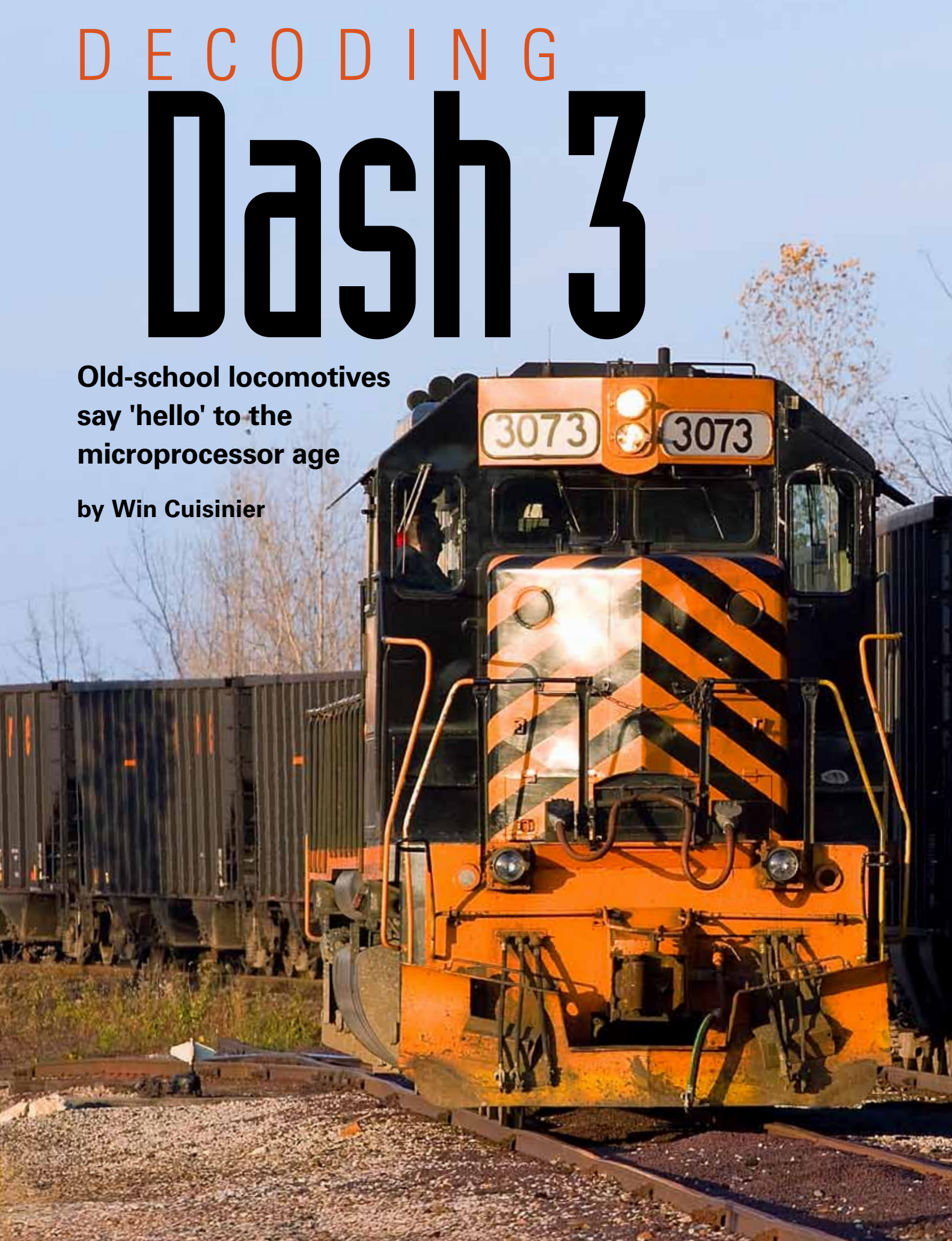
Ellis says he intends to operate all of his vintage streamliners, as well the passenger equipment that he's purchased. "We are planning to put every locomotive and car we own into service," he says. "We're not a museum, we're not buying things to scrap them, we are not buying them for parts. At this point everything — coaches, sleeping cars, diners, locomotives — is going to be operated. We are in the railroad business, we're going to be in the railroad business for the next 25 years, and this is the stuff that people want to see."

STEVE GLISCHINSKI is a freelance writer and photographer, based in Minnesota.

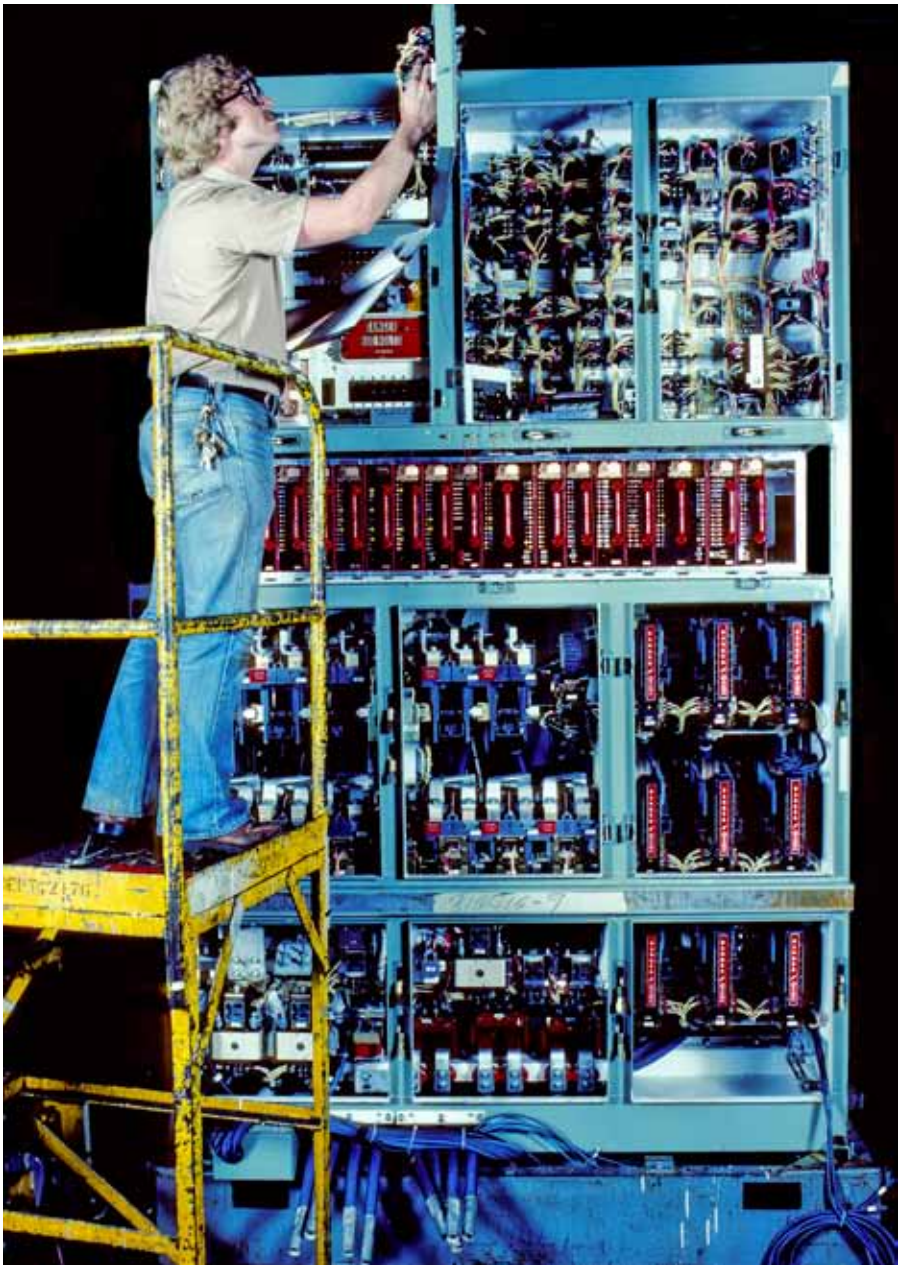
DECODING Dash 3

Old-school locomotives say 'hello' to the microprocessor age

by Win Cuisinier



Don't be fooled by the classic Sixties styling of Wheeling & Lake Erie Nos. 3073 and 3102 working at Huron, Ohio. They may look like stock SD40s, but they've been upgraded to "Dash 3" specs with microprocessor controls to vastly improve their performance and maintainability. Tom Danneman



This photo illustrates the full height and complexity of an EMD Dash 2 electrical cabinet, with its many modules, relays, and contactors. Microprocessors have eliminated most of these modules and many of the small relays. EMD

Programs are under way today on many major railroads to upgrade older locomotives to a new generation of control technology. Some of these units were built with 1950s control technology while others were constructed with the Electro-Motive "Dash 2" and "Super Series" controls of the 1970s and 1980s. These systems are gradually being replaced with a new generation of microprocessor-based locomotive controls that collectively have been given the nickname "Dash 3" systems. Hundreds of locomotives, primarily older EMDs, have been upgraded to Dash 3 specifications in life-extending programs embraced by Class I railroads, regionals and lease fleet operators.

For decades, relay logic was the finest and most versatile control system available for diesel-electric locomotives, and a small group of specialists designed circuits that controlled switch gear operation. Relay logic systems hit their peak of complexity in the late 1960s, just about the time the industry changed from D.C. main generators to A.C. traction alternators. As locomotives reached 2,500 hp and beyond, D.C. main generators were approaching the limits of their voltage and current capabilities. They required extensive use of field shunting protection to limit the voltage on the main generator, and increasingly sophisticated wheel-slip control technology to manage the increased power available from higher-output diesel engines.

When A.C. traction alternators appeared in the mid-1960s, electrical designers were initially reluctant to simplify field shunting and other protective systems, owing to concerns about the peak inverse voltage limitations of the large banks of diodes used to rectify A.C. output of traction alternators to D.C. for use by the traction motors. As the new machines proved themselves in service, and as diode quality increased, it became possible to reduce the shunting provisions. Meanwhile wheel-slip control technology was advancing, although in the 1960s it was still based on static contact between the wheel and the rail. Electro-Motive introduced its Instantaneous Detection and Control wheel-slip system as an electronic "black box" addition to locomotives in 1967, proving to be a fast and capable wheel-slip limiting system. When Electro-Motive Division introduced its "Dash 2" locomotive line in 1972, the old wheel-slip system became the WS10 module, a component of an installation of solid state controls that included throttle response, loading rate-control (a feature that limits the rate at which load can be applied, protecting traction motors, helping to avoid break-in-twos), performance feedback, excitation controls, and other protective functions. The WS10 was tested on Union Pacific DDA40X "Centennial" locomotives, starting in 1969.

In between the relay logic control systems and the development of the microprocessor locomotive control systems of today came a significant advance that is largely overlooked, because the locomotives that carried it subsequently proved to be troublesome. That advance was the controlled rate of wheel-slip technology, exemplified by the "Super Series" wheel-slip control system introduced and tested on the GP40X locomotives built in 1977 and fitted to the EMD "50-Series" production. This advance took wheel-slip control technology a giant step forward by enabling the wheels to operate at speeds slightly higher than the locomotive's rate of advance on the rail, in other words a "controlled" rate of slippage. The benefit was significantly higher rates of adhesion than was possible with static adhesion wheel-slip control systems, and the feature was carried forward into the development of microprocessor control systems.

While the locomotive builders struggled with the need for increasingly sophisticated control technology that could monitor a variety of inputs and operate a wide range of auxiliary devices, computer manufacturers were rapidly advancing to new levels of performance and flexibility in machines for home and industrial use. Between the late 1980s and early 1990s, the capability of

KCS GP40-3 No. 2951, built as a Frisco GP40-2, leads eastbound local LRNRN on UP trackage through Richmond, Texas, on March 13, 2013. KCS has upgraded many of its GP38-2s and GP40-2s to Dash 3 specs. Mike Danneman

computers and microprocessors met and exceeded the requirements to operate a locomotive. Also, as "hardened" industrial quality components became available, microprocessor devices took over as the preferred system for locomotive control.

Compared to the capabilities of modern home computers, a locomotive's control needs are not demanding. Most current locomotive microprocessors are on a level of performance comparable to 486-series technology that preceded Pentiums.

Stepping up

Reliable aftermarket computer control systems for locomotives developed in the late 1990s and are now a mainstay of locomotive upgrade programs. One of the most common candidates for computer control system upgrades is the EMD Dash 2 series, originally built in the 1970s. These locomotives retain a relatively high value and are at an age where the replacement of control wiring is necessary due to insulation deterioration. When fitted with an upgraded computer control system, these locomotives are typically designated "Dash 3s."

For example, the Q-Tron QES-III, which is a popular aftermarket system for locomotive upgrades, is often selected for installation in older EMD locomotives like the Dash 2 series, using an A.C./D.C. AR-10-type traction alternator and D.C. traction motors. The largest components in the system include the electronic control unit, which is the heart of the system and contains the cardfile of operating electronics, plus the computer display unit, which is the operator's interface with the system, and possibly an electronic fuel injection control unit for engines that use electronic unit injectors. For locomotives where the emissions requirements allow the continued use of older mechanical fuel injector systems, actuator units take the place of Woodward PG-type governors to operate the mechanical fuel rack system.

Monitoring devices that provide information to the microprocessor can include a transducer manifold with pressure switches that look at engine functions, temperature sensors that look at ambient air temperature, axle generators to look at locomotive wheel speed, voltage and current monitoring devices to observe the voltage of the main generator and each traction motor, as well as the current flow through dynamic brake grids and grid blower motors. Typically, locomotives have an external communications port so that a laptop computer can communicate with and download information from the system. Finishing out the installation, the upgrade has a load resistor panel that makes the computer multiple unit lines more compatible with older locomotives, and warning sirens for automatic engine starting.

The electronic control unit includes a cardfile frame with the individual cards containing the power supplies, microprocessor, communications system, various input and output cards, voltage regulator, and the excitation system sensor card. At the bottom of the cards is a row of LEDs that indicate if the power supply is working and if each card is drawing power. The faceplates of the analog input/output cards have test points where you can plug in a meter to monitor temperature, pressure, or other information feeds.

The digital input/output cards handle the functioning of specific control devices and electrical components in the locomotive, and have LEDs on the faceplate to tell if the controlled circuits are high (energized) or low (not energized). These numbered LEDs are identified in a menu that is fixed to the inside of the front cover, and they are given names that correspond with traditional EMD locomotive operating components. Thus, anyone familiar with a Dash 2 locomotive can easily identify and monitor the various control functions.

To control the locomotive, the microprocessor monitors the inputs provided by

Typical Dash 3 features

- Microprocessor control system (CPU)
- Computer Display Unit (CDU) that displays alarms and messages
- USB port capability
- Integrated event recorder function
- Crash hardened memory module
- Consist performance monitoring
- Installed (or provision for adding) central reporting
- Installed (or provision for adding) PTC

The brains of a typical EMD EM2000 Dash 3 upgrade: the large box on the upper right is the PRG301 and related modules that form the power supply regulation system. To its left are cards that monitor, operate, and control various functions of the locomotive. At right, is the EMD user interface with specific function keys and directional arrows for paging through the data displayed on the screen.
Christopher Palmieri

system controls and sensors, processes them using its software subroutines, and issues the necessary operating and control commands to the locomotive equipment through the communications bus, output channels on digital input/output cards, voltage regulator, and the sensor panel.

In the case of the digital input/output card channels, each of which is usually controlling a relay, a contactor, or serving as an electrical switch, there is generally a return feed from the device, which tells the computer the external component has operated properly. The microprocessor also communicates with a variety of vendor-provided peripheral devices that vary with the type of air brake and engine fuel injection systems that are being used. Examples include Wabtec's electronic air brake system, Fastbrake, and aftermarket electronic fuel-injection control systems from Heinzmann. In locomotives repowered with high-speed engines such as those from Caterpillar, Cummins, and MTU, the computer may have to work with proprietary control systems. These systems have their own language that must be built into the software and hardware package of the locomotive control computer.

A locomotive's Facebook status

While the central processing unit is communicating with and operating all of these devices, the system is recording and storing a file of all received inputs and the issued control commands. In the past, this information was recorded in memory up to the available storage capacity, and then overwritten with new information. New technology has integrated the locomotive event recorder with the locomotive control computer in some installations, enabling the control information to be written to a crash-hardened memory module that can store weeks of operating records.

The computer display unit is the primary operator interface with the locomotive control computer. It displays system information and data on a series of screens that operators can call up. These screens can display operating readings from all on-board sensors, the state (energized or de-energized) of relays and contactors, the status of all wires on the m.u. receptacle trainline, as well as readings of fuel level, ambient temperature, and the setting and operation of system features. On some locomotives, the computer display unit is the primary information display device and is located in the stand or console close to the operator's line of sight. In other installations, such as those retaining traditional analog gauges and meters, it may be used as a supplemental display and interface and can be positioned in the electrical cabinet in back of the operator. Positive train control has generated the need for another display unit that needs to be placed within the operator's sight. New production locomotives and replacement control stands now have a panel to accommodate positive train control displays.

Any locomotive malfunctions will generate an alarm message on the screen and simultaneously record system stats, which can be downloaded to assist with troubleshooting the locomotive's performance. The messages can be accessed on the computer display unit or downloaded to a laptop computer, using the builder's proprietary software. (Technicians using laptops to diagnose locomotive problems are exempt from the ban on electronic devices in the cab that normally applies to train crews.)

If an alarm event occurs, the system retains a series of successive scans of all analog and digital inputs and outputs, recorded in rapid succession, beginning a second or two before the reading that triggered the alarm. When a longer-term record is needed, technicians can download the event-recorder memory. In locomotives equipped with cab signals, the cab signal system often saves a parallel information file in its own storage format. For further assistance, the monitoring software can also record and download real-time files, covering all functions of the locomotive. This feature can be switched on or off as needed, such as to record the results of a self-load test, an over-speed test, or throttle manipulations.

One can monitor several hundred functions in a modern locomotive control computer. This comprehensive record of locomotive performance, saved in real time, opens the door to another realm of equipment monitoring, the central reporting system. Now it is possible for the locomotive to transmit its on-board information to a central base location, either as periodic reports or as a continuing string of data. This recent development makes it possible for the engineer on an ill-operating locomotive to contact his railroad's "help desk" and ask them to remotely review his locomotive's function, and examine the alarms and recorded data to search for problems.

Testing, testing

The on-board software of the locomotive control computer typically has self-test features for troubleshooting the system, like cooling fan tests, self-load and load-box test setup, monitoring, relay tests, contactor tests, the ability to position the engine fuel rack for setting fuel injectors, and a feature to run the fuel pump for short intervals to prime the system or check for leaks. Tests that involve cycling of the electrical relays and contactors generally can be done with the locomotive engine shut down.

Another important feature of the control system upgrades is the ability to provide automatic engine starting and stopping. This system is designed to save fuel and reduce noise and pollution by shutting down the engine automatically. These systems monitor ambient air temperature, main reservoir air pressure, brake cylinder pressure, battery charging, charging voltage, as well as the performance history of some of these variables, to determine whether a locomotive can be shut down

Freshly painted in Pennsy-inspired Tuscan Red, Louisville & Indiana GP38-3 No. 2001 leads the southbound Indianapolis-Columbus, Ind., "CA" near Edinburgh in May 2013. Built in 1967 as a GP38, No. 2001 started life as B&O 3824. Pete Ruesch

without the risk of freezing or losing air pressure and brake application. If these criteria are met, the system shuts the engine down, then samples the readings from all its sensors to keep track of what is happening on the locomotive. If one of the monitored conditions falls outside the acceptable range, it restarts the locomotive and then idles it until all the conditions for a shutdown are again satisfied. Automatic engine starting and stopping has also been available as an aftermarket "black box" kit for retrofit to older locomotives, but it is particularly convenient to use when it is a standard feature of a locomotive control system upgrade package.

Attractive candidates

EMD-built road locomotives that qualify for Tier 0 and Tier 1 emissions standards are attractive candidates for upgrading to newer control systems. This upgrade costs less than purchasing new power. Such upgrades solve the problem of finding increasingly rare EMD Dash 2 and 50-series modules. Installing replacement control systems at this time is also more feasible because of the parallel need to replace aging control wiring and cabling. As a result, makers of locomotive-control computer systems have been careful to keep products within dimensions that enable the computer to fit into a Dash 2 or 50-series module rack.

The enhanced wheel-slip control made possible with microprocessors is a valued upgrade feature. Modern control systems can increase reliable adhesion of this family of locomotives from the previous 18-percent range (24 percent with perfect rail and operating conditions) to the 30-percent range. In many types of service, this level of performance enables two units to do work previously requiring three locomotives. The replacement control systems market is by no means limited to EMD products, they just happen to be the largest group due to original sales and fleet age. The same locomotive control computer systems can also be adapted to GE, Alco, or other products when equipped with suitable sensors and programming.

Customized nose and cab design gives CSX SD40-3 rebuilds an unmistakable look. No. 4021 leads an SD70MAC at Walton, Ky., in October 2011. Brian Schmidt

WIN CUISINIER is a pseudonym originally developed by the late Don Dover of Extra 2200 South *magazine for an engineer who worked for four decades in the railroad equipment-building business. Along the way, he authored dozens of articles on locomotives and industry developments. The name "Win" was borrowed from Winton Engine Co. and "Cuisinier" is taken from a translation of his last name to a foreign language. He is retired now, and the pseudonym has been resurrected one more time for this article, more than 40 years after the name first appeared in print.*

Rebuild. Relax. Repeat

Grab lunch and check out the shop at this southwestern Illinois locomotive-rebuilding company

Story and photos by Steve Smedley

You don't have to travel far for lunch during a visit to Metro East Industries in East St. Louis, Ill. And, who'd want to? The railroad's 75-acre, locomotive-and-railcar-rebuilding facility includes a pair of bright red, repurposed Alton & Southern cabooses that serve as kitchen and dining cars for employees and visitors.

Complete in a Steak 'n Shake-themed décor of black-and-white tiles, the dining caboose features home-cooked meals and an O-scale freight train (custom painted in a Metro East Industries scheme), operating on an overhead loop of track. "Our customers love it," says Rick Ortyl, Metro East Industries vice president. Many business meetings have taken place while having lunch in the caboose, he says.

The conversion of the cabooses into a place for employees to eat on-site was the brainchild of co-founder, Ron Ortyl, who wanted to give employees a place to eat quality food at an affordable price. Shortly after Ron passed away, shop workers provided a monument in tribute. "Dedicated to Ron Ortyl in recognition of a great & generous man who built this company that provides so much for so many, thank you. Your Alorton shop employees." It's not difficult to see why this locomotive rebuilder rests on a strong foundation.

Work in progress: Helm, Union Pacific, and Canadian Pacific Geeps, along with a GP40 being converted to a "Multi Purpose Machine" power unit in the Metro East Industries shop.

Four generations of the Ortyl family share lunch in Metro East Industries' Steak 'n Shake-themed dining caboose. Clockwise from left: Jen Dolce, R.J. Ortyl, Rick Ortyl, Gayle Ortyl, and Cindy Tampow. "Our customers love it," Rick says.

Rick Ortyl (left) and locomotive division manager Wade Clevenger with Copper Basin 302.

MEI president Gayle Ortyl and son Rick.

With four generations of the Ortyl family finishing lunch, a visiting photojournalist pops the question: "So who's the boss?" Without hesitation, Gayle Ortyl quickly answers, "I am!"

Four generations

The elder Ortyl, widowed by co-founder Ron Ortyl in 2007, twirls a small golden steam engine pendant on her necklace as she goes back to work, sorting billing and invoices. "She's here when I come in, and she's here when I go home. My mother says the business is the child that never grew up, and it's her baby," Rick says. Gayle serves as president of the company; her office strategically located between those offices of her son Rick, and daughter Cindy Tampow.

"I can keep my eyes on them," Gayle says. With framed photographs, and awards adorning the office, the family side of the business is evident. Representing the third generation, Rick's son, R.J. Ortyl, is production manager, while his cousin, Jen Dolce, serves as company controller.

"We do frame up overhauls, variable repairs as required, along with light to medium wreck repairs," Rick says. Helm, GATX, and CIT leasing companies are big customers, along with several Class I railroads.

Outside the main locomotive shop, newly completed Copper Basin Railroad GP40-2 No. 302 gleams in the unseasonably warm sun of a March 2013 morning. DeCarlos Underwood uses a cotton shop towel to wipe a smudge of dirt from the fresh paint. "This is the best part of my job," Underwood says, "getting them out the door on time!"

Copper Basin 302 is part of a two-unit order, transforming straight GP40s to upgraded Dash 2 locomotives including complete low-voltage rewiring. Rebuilds such as these are MEI's specialty.

Deep within the confines of the complex, several Union Pacific GP38-2s fill a brightly lit shop floor. A total of 102 lessor Helm Financial-owned engines will be overhauled and returned to UP service in fresh burgundy paint with HLCX lettering.

Quality control employee, Robert Trotter straddles a radiator fan, armed with a clipboard and flashlight, checking radiator-cooling fans on GP38-2 No. 1037. Nearby, a welder installs a new UP-specified tool rack in the air-compressor room.

Not a lot we can't do

Next to the GP38-2, electrician Robert Shumaker works on wiring and testing the control stand of a Multi Purpose Machine, one of six being constructed for track maintenance company Herzog using retired GP40s as core locomotives. Upgraded to GP40-3 specifications, the completed units will power Herzog work trains operating nationwide.

"What we cut our teeth on as a company — the lease market — has gone down, but our large project work appears to be growing," Rick says. Another current UP project has 60 MP15s moving through the shop for ZTR-Nexsys-micro-processor-package installations and light repairs.

The father-and-son-fabricating team of Brandon and Russell Helfer use torches to cut out the coupler pockets of a former UP SW1500. Built as Southern Pacific 2677, and still in SP paint, No. 1222 is being modified to feature alignment-control draft gear, and upon completion, it is bound for customer United States Sugar Corp. in Clewiston, Fla.

In stark contrast to ready-to-roll Copper Basin 302, the north side of the main engine shop holds a treasure trove of locomotives in various states. A primer-coated BL2, with a weather beaten cardboard box on a footboard marked "56," gives away Bangor & Aroostook as its original owner. The Iowa Pacific-owned locomotive is in the process of being returned to service.

A track away, a tired-looking SD40-2, in the unmistakable red, white, and blue of former owner BC Rail, awaits the scrapper's torch. Retired from lease service as HLCX 6206, the veteran EMD will be harvested for reusable components before being cut up for scrap. Nearby, hood sections and radiator grids torched from onetime Burlington Northern SD40-2s — locomotives that spent countless thousands of horsepower hours tugging on Powder River Basin coal loads — lie in neat piles on fresh ballast.

"We dismantle and reclaim alternators, traction motors, rotating equipment, dynamic brake grids, and control stands … anything that can be repurposed," says Wade Clevenger, locomotive division operations manager. Clevenger, who started with the company as a mechanic and now supervises 110 shop employees, is in his 17th year with Metro East.

Father-and-son team Brandon and Russell Helfer cut away coupler pockets as UPY 1222, a former Southern Pacific SW1500 still in original paint, is rebuilt for United States Sugar.

In the main locomotive shop, Jerry Strobel works on the reconditioned truck of a freshly overhauled and repainted Helm Financial GP38-2.

Helm 6206, a retired SD40-2 still in BC Rail red, white, and blue paint, awaits its fate. The unit will be salvaged for usable parts and scrapped.

Former Manufacturers Railway MP15DC No. 258 and two Geeps sit outside the MRS St. Louis shop. Metro East is currently leasing space in the shop to perform light repairs on locomotives.

Nothing goes to waste. Cab and nose section from a scrapped Conrail SD is stockpiled for possible sale or reuse.

Ready to roll, newly rebuilt Copper Basin GP40-2 No. 302 poses with former Iowa, Chicago & Eastern Geeps.

The main locomotive shop features six tracks, three of which run through the shop. It is equipped with several overhead cranes and capable of housing up to 21 locomotives. "We can do in-frame overhauls, Class B overhauls, change out power assemblies, blowers, cams, and crankshafts. There's not a lot we can't do," Clevenger says. "I love my job … my whole working career has been as a mechanic, and I have no desire to do anything else. I enjoy people, and the people I work for, and it's a different job every day."

At the south end of the complex is a new $2.5 million paint shop. Completed in 2011, the facility is comprised of four stations. A wash rack, using a specially formulated detergent, prepares locomotives for the painting process. Running through the shop, a single track guides locomotives through a sandblast room, painting room, and finish room, all separated by overhead doors. The spotlessly maintained paint shop features a state-of-the-art filtration room and a fire-suppression system.

With late-winter sunlight streaming into the bay, lead painter Kenny Loyet and painter Eric Davis place American-flag decals on Roman-numeral-numbered Herzog MPM rebuild "XXXVIII." A complete locomotive paint job generally requires five days from start to finish, R.J. says.

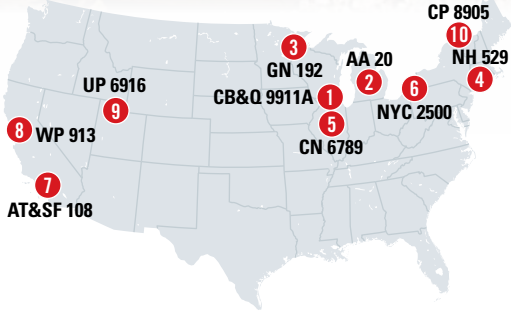
MEI workers provided this monument in tribute to company co-founder Ron Ortyl, "a great and generous man."

The building where the business began in 1989 is now home to a storage area for large components. Mechanics James Zahn and Brian Helfer use a 20-ton overhead crane to lift new leaf springs into a two-axle truck bound for one of the HLCX rebuilds. "It's hard to believe this is where we started," Rick Ortyl says, as he walks past stockpiled EMD 645 engines from an ongoing program to salvage components from 53 former BN SD40-2s retired from Helm lease service.

"I thoroughly enjoy what we do here," Rick says enthusiastically. "It's way more than a job, and it's way more than a business." ▮

STEVE SMEDLEY is a photojournalist for The Pantagraph *newspaper in Bloomington Ill. He, wife Donna, and son, Sam, live in nearby Atlanta, Ill.*

10 Preserved Diesels You Must See



At first, it seemed like a perfectly good idea: a top 10 list of preserved diesel locomotives. There's something irresistible about lists, whether it's the top 40 charts from 1960s A.M. radio, or Rolling Stone magazine's epic undertakings, such as the 500 greatest albums of all time and the 100 greatest Beatles songs, or David Letterman's nightly top 10. But where to start?

An academic assessment quickly proved overwhelming. Certainly no respectable list would be complete without the likes of Central Railroad of New Jersey 1000, the pioneer Alco-General Electric Ingersoll Rand box-cab at the B&O Railroad Museum in Baltimore; Delaware, Lackawanna & Western 426, an Electro-Motive SC built in 1935 and displayed at Steamtown in Scranton, Pa.; or EMC FT cab unit No. 103 at the Museum of Transportation in St. Louis. What about Atlantic Coast Line 501, the E3A magnificently restored at the North Carolina Transportation Museum in Spencer, or Ingersoll-Rand box-cab No. 90 at the Henry Ford Museum in Dearborn, Mich. Maybe, we thought, we should follow Rolling Stone's lead and go with a top 100.

Instead, we kept it to 10 and made it personal. We contacted 10 respected railroad journalists and photographers and asked each to select and write about the preserved diesel locomotive they'd most like you to see. Our only stipulation was that the locomotives chosen must be accessible to the public.

What's on your list? We'd like to know the locomotive at the top of your "must see" list, and why. We'll carry on the discussion on the TRAINS Facebook page and keep a running tally of your votes. The locomotive receiving the most votes will be the subject of a feature story in the next issue of LOCOMOTIVE, and we'll make a $1,000 donation to the museum or group responsible for its care. — *G.J.M.*

1. Chicago, Burlington & Quincy E5 No. 9911A

Diesel with a capital 'D'

Perhaps the most famous diesel-powered train is Chicago, Burlington & Quincy's *Pioneer Zephyr*. Built by Budd of gleaming stainless steel and powered by Electro-Motive Corp., the *Zephyr* showed railroading in 1934 that the diesel was ready for mainline prime time. Today, the little *Zephyr* is a major exhibit deep inside Chicago's Museum of Science & Industry.

At Union, Ill., 60 miles northwest of the *Zephyr*'s display place, a direct descendant of the landmark streamliner routinely runs at the Illinois Railway Museum — and sometimes beyond. Burlington Route E5A No. 9911A was one of 15 E5s (11 A units, 5 Bs) that Electro-Motive built for CB&Q between February 1940 and June 1941. Internally, the 2,000-hp E5s were the same as the E6, introduced in January '40, but their stainless-steel exterior, based on the styling established by the *Pioneer Zephyr* (and including *Silver*-prefix names — 9911A is *Silver Pilot*), prompted a separate model designation. The E5s were unique to the Burlington, which retired the last ones in 1967.

Herbert N.W. Hansen, IRM president in the mid-1960s, purchased the 9911A from a scrapper. All other E5s were torched. From CB&Q, he bought a train in 1968 to go with the E5: a seven-car articulated Budd consist built in 1936 for *Twin Zephyr* service and retired earlier in '68 off the *Nebraska Zephyr*.

Silver Pilot — which in its later years was among 11 E5s CB&Q assigned to subsidiaries Colorado & Southern and Fort Worth & Denver (9911A became C&S 9952A and FW&D 9982A) — is the third oldest of the 80-odd E units in existence, the oldest currently in operating condition, and the glamour girl of IRM's more than 45 diesels. Paired with the *Nebraska Zephyr*, she runs frequently on IRM's 4.5-mile line.

What sets the 9911A apart from most museum equipment is her occasional forays onto the main line. Over the past two decades, Class I and regional railroads have hosted the locomotive and train on several occasions. Most recently, in September 2012, were two excursions from Chicago Union Station to Quincy, Ill., on BNSF — old home turf for 9911A. Running at up to 79 mph, *Silver Pilot* turned back the calendar to the time when "Diesel" was spelled with a capital "D."
— *Robert S. McGonigal*

On Sept. 23, 2012, CB&Q E5 No. 9911A and the *Nebraska Zephyr* depart Chicago Union Station on an excursion to Quincy, Ill., and return. Marshall W. Beecher

2. Ann Arbor RS1 No. 20

A community effort

The Alco-GE RS1 of 1941, considered by many to be America's first true road-switcher, deserves a salute. Known for its assist overseas in World War II, in modified form, what came to be labeled the RS1 proved popular and versatile. It had the longest U.S. diesel model run, 1941–1960, with 469 built. North American buyers numbered 44, 31 of them Class I railroads; 64 went to Mexico. Later re-sales scattered RS1s among short lines.

More than a dozen survive. A few haul riders for museums or tourist lines, while others are static displays. My RS1 representative, Ann Arbor Railroad No. 20, is displayed in a park by the main line on which it worked (now Great Lakes Central), in tiny Shepherd (pop. 1,500) in the middle of Michigan's Lower Peninsula, 55 miles north of Lansing. Shepherd's railroad park display stands in for hundreds of them across the land and centers on the restored 1890s station that "the Annie" sold long ago to the chamber of commerce. The late Tom Barrs put together the display, which includes Ann Arbor caboose No. 2845 and a Detroit, Toledo & Ironton boxcar.

Ann Arbor finished dieselizing in early 1951 with 20 Alcos. Its two RS1s, No. 20 and 21, were intended for Annie's little passenger train, hence their road colors. The service ended in mid-1950 as the RS1s were abuilding (only the 20 got a steam boiler), so they worked local freights and yard jobs; neither had m.u.

I first photographed No. 20 in Annie's Owosso, Mich., shop in 1960, but a later contact was special. In early 1962, Wabash briefly leased both RS1s, and during that spring, each drew the road-switcher job out of my college town of Jacksonville, Ill.

DT&I bought AA later in '62, and the RS1s were repainted orange, with an AA "compass" emblem, No. 20 in March 1971. Both were handed down to 1977 successor Michigan Interstate and then to the Southern Michigan Railroad Society of Clinton. In the early 2000s, No. 20 was moved to Shepherd; the railroad society is restoring No. 21. I first saw No. 20 at Shepherd in 2004, still orange; she was repainted the following year.

Shepherd is off the beaten track for mainline action and big-time rail museums, but if you're in the area, its park display is worth a stop. — *J. David Ingles*

Ann Arbor 20 spent some of her later years leased to parent Wabash and then on new parent DT&I. She's at Brush College yard office (top photo) in Decatur, Ill., on April 20, 1962; with GP9 No. 988 and leased LS&I U25C No. 2500 at DT&I's Flat Rock, Mich., roundhouse in May 1965; and finally, resplendent in old colors at Shepherd in July 2009. Top and right, J. David Ingles; lower left, H.G. Goerke

>> See video footage of CB&Q 9911A and more.
Visit www.TrainsMag.com/Locomotives

3. Great Northern NW5 No. 192

One of only 13 built

Growing up in Minnesota in the 1960s, I frequently heard about a fascinating Great Northern mixed train that operated on the Hutchinson Branch, a 44-mile line west out of Minneapolis. "The Hutch," as it was known, left the GN main line at suburban Wayzata and traversed prairie country to its namesake town of Hutchinson. The train was remarkable for its assigned equipment: GN No. 186, a rare EMD NW5, and home-built caboose X-181, which was extra long to include room for mail, LCL, and even a passenger or two.

Similar to the Alco RS1, EMD's NW5 developed 1,000 hp, had a switcher-style long hood and cab on a stretched frame plus a short hood for a steam generator, and moved on Blomberg road trucks.

The NW5 did not catch on. Only 13 were built, between December 1946 and February 1947, and all but three for GN (Union Belt of Detroit got two and Southern Railway one). However, the NW5 and the short-lived BL2 were precursors to thousands of EMD Geeps that followed. GN found its 10 NW5s ideal as branch-line power, and they remained in service for 1970 successor Burlington Northern into the 1980s.

I never did get to see GN No. 186 on the Hutch, but there is still an NW5 operating in Minnesota. Restored GN 192 found a home at the Lake Superior Railroad Museum in Duluth, where you can ride behind it. Resplendent in its original colors, GN 192 pulls tourist trains on the museum's North Shore Scenic Railroad, a former Missabe Road line to Two Harbors. As an early example of road-switcher design, the NW5 is worth a look by any diesel enthusiast. No. 192 also occasionally handles special mixed trains during the museum's periodic "Railfan Weekend," which is almost as good as seeing "the Hutch," after all! — *Steve Glischinski*

Shades of "the Hutch!" GN 192 crosses Tischer Creek near Duluth, Minn., with a mixed train operating on the North Shore Scenic Railroad in 2006. Steve Glischinski

5. Canadian National FPA4 No. 6789

Far from home

The robust sound of an Alco 251 engine fills the air in east central Illinois as the 3:30 p.m. passenger train at the Monticello Railway Museum departs Nelsons Crossing south on a leisurely 3-mile run to downtown Monticello. This former Illinois Central branch line is about as far removed as you can get from Canadian National main lines in eastern Canada, where CN FPA4 No. 6789 spent most of her career. Today, the 1959-built MLW takes it easy, pulling slow-moving passenger trains in a rural setting.

Along with FPB4 No. 6862, CN No. 6789 has been a fixture at the museum since arriving in 1994. Privately owned, the MLWs came to the museum after retiring from VIA Rail Canada passenger service in 1989. Museum volunteers stripped off the blue-and-yellow VIA paint, much of it by hand, as the A-B duo was restored to its handsome as-delivered CN colors. Once a year, in December, CN No. 6789 gets to stretch her legs on a mainline passenger train as Norfolk Southern borrows museum equipment for its Santa Train employee specials out of nearby Decatur.

"They are very reliable," says Paul Nelson, 69, of Champaign and MRM's lead mechanic.

Nelson, a 25-year MRM volunteer, has invested blood, sweat, and tears to keep the museum's eclectic fleet of locomotives operating. While he professes no favor for any one model, you can tell that the 251-powered cab unit occupies a special place in his heart. "It's a treasure to us!" Nelson notes with enthusiasm. — *Steve Smedley*

Far from its Canadian haunts, CN 6789 races a Santa Train eastward at Iliopolis, Ill. Two photos, Steve Smedley

4. New Haven RS3 No. 529

Hardly a museum piece

Perhaps no locomotive type better represents New England's early diesel era than the Alco-GE RS3. Alco and Canadian ally MLW built 1,370 of the round-hooded, 1,600-hp road-switchers between 1950 and 1956. New England roads large and small had them: New Haven, Boston & Maine, Rutland, Maine Central, Grand Trunk, and Central Vermont. "Outside" railroads New York Central, Canadian Pacific, and Delaware & Hudson also ran their own RS3s into New England.

Today, one of this once-common breed, New Haven No. 529, continues to serve in its original territory.

New Haven's 45 RS3s covered all types of service. Built with steam generators and 80-mph gearing for mainline passenger work, they were equally comfortable on road freights, locals, and yard jobs. Most of the fleet survived to work for Penn Central, and some made it onto Conrail's roster in 1976.

It seems appropriate that the last native RS3 still running in New England is from NH's versatile fleet.

Based at the Naugatuck Railroad in Thomaston, Conn., New Haven RS3 No. 529 carries passengers through Waterville on its old home turf. Scott A. Hartley

Oddly, the continued presence of a "pure" (244-engined) RS3 can be credited to Amtrak. The passenger railroad acquired 45 Penn Central RS3s for work train service in 1976, and many remained in service until 1985. Enter a small group of Railroad Museum of New England members, who pooled their dollars to enter the successful bid on one, Amtrak No. 138. It had begun life in August 1950 as New Haven No. 529, and museum volunteers wasted little time in returning the unit to its final NH appearance. Since 1996, the 529 has run regularly on the museum's Naugatuck Railroad, based in Thomaston, Conn., on a former NH route.

No. 529 is scheduled to receive new wheels and traction motors this year, and will continue to run on special occasions on "the Naugy." Railroad President Howard Pincus emphasizes that the 63-year-old locomotive is a museum piece. "It's old, and we don't want to wear it out completely," he says.

But to watch the veteran Alco attack the northbound grade out of Thomaston with a string of even older former CN heavyweight coaches, one would never consider the 529 to be a "museum piece."

— *Scott A. Hartley*

6. New York Central U25B No. 2500

Locomotive to the future

It rests today in unadorned splendor, just a few yards from the tracks where, a half-century ago, it helped a battered New York Central forge a new identity. The tracks where it fought all the snow Lake Erie could muster. The tracks where it put in motion what Al Perlman made possible with CTC, double track, and Flexi-Vans. The tracks where it did its part to create the Road to the Future, even if only for a few short years.

Of all the worthwhile equipment displayed at the Lake Shore Railway Museum in North East, Pa., NYC U25B No. 2500 is easily the most important. For its original owner, it symbolized the era when a pioneering CEO made a heroic effort to turn fat NYC into the lean prototype for a new kind of railroad. For builder General Electric, it was the advance guard in a new battle for the diesel market, a battle no one thought it could win, but which it did. Plain Jane compared with the more stylish products of Electro-Motive, and unreliable in the comparison, the 2,500-hp U25B still pulled like hell. NYC liked that about the U25B, and eventually ordered 70 of them, more than any other railroad.

The "U-boat" was blue collar, but it could put on a classy performance, something I witnessed in March 1966, though not on the storied Water Level Route. Rather, my experience was on the old Michigan Central, relegated by the mid-1960s to secondary status and maintained only to fulfill passenger-train obligations to the Interstate Commerce Commission.

NYC did manage to run one truly hot MC schedule,

NYC 2500, first of 70 Central U25Bs. "Blue collar, but it could put on a classy performance." J. David Ingles collection

westbound mail and express train No. 13, which skipped the usual crew-change stops once it left Detroit. That March afternoon I was hiking along the old MC as a wet snowstorm blanketed southwestern Michigan. I knew when to expect the headlight of the mail train, and sure enough, it peered through the soup right on time. The headlight was that of an E7, no doubt.

Routine became revelation, though, when the entire train emerged: four U25Bs, shiny in their black-and-white cigar-band NYC paint, rumbling urgently westward with a long line of baggage cars, mail cars, and the requisite rider coach on the end — doing all of 79 mph.

A U25B might look dowdy resting on a display track in a museum. But lash four of them together on the point of a worthy train, and the U-boat creates an entirely different impression. That afternoon in the driving snow, those burly GEs looked like "Locomotives to the Future."

— *Kevin P. Keefe*

7. Santa Fe FP45 No. 108

The last shall be first

At first thought, an EMD FP45 preserved might not seem remarkable. Just 15 were built, and six of them reside in museums from Illinois to Texas to California. Santa Fe and Milwaukee Road were the only buyers, and Milwaukee's five were scrapped decades ago.

Mechanically, no technological ground was broken when the FP45s rolled off the floor at La Grange in 1967. Their 20-cylinder 645E3 prime mover was in mass production for SD45s headed to many Class I roads; ditto the main alternator, trucks, and assorted electrical components.

But to understand the time and circumstances of the FP45 is a window on the massive changes going on in the railroad world. Passenger trains were a losing proposition. Santa Fe, whose attitude toward them was to "run them right," was also studying a new generation of intermodal trains, a premium freight service that would operate at passenger-train speeds and punctuality. Santa Fe specified a dual-purpose locomotive that looked like a passenger engine, and that was a rare request in the late 1960s.

Santa Fe's nine FP45s arrived after competing designs from GE hit the property. No. 108 was the last of the group. All were dressed in the original rendition of the "warbonnet" paint scheme designed in 1938 by EMD's Leland Knickerbocker and worn by every AT&SF passenger road locomotive since.

No. 108 carried the passenger-train banner for less than four years, led countless *Super C* intermodal hotshots, and helped on Amtrak assignments into the mid-1970s. There were renumberings, reassignments, repaintings, and rebuildings before her last hurrah in 1989, when, under the direction of Santa Fe President Mike Haverty, she and her stablemates became the first of the reborn warbonnets, showing off to a new generation what is arguably the most famous look in American railroading.

BNSF Railway retired the unit as No. 98 in worn but running condition. Her warbonnet paint faded to a pinkish-red, No. 98 was graciously donated in 1998 to the Orange Empire Railway Museum in Perris, Calif. Experts have nearly completed a painstaking restoration of this proud steed to her "as-delivered" appearance, in the original warbonnet, with small, black passenger-style "Santa Fe" lettering on her flanks. She is to roll out this fall as the first preserved FP45 thus restored, looking ready to take the point of a *Super Chief/El Capitan*. Fans will celebrate that she not only runs, but represents a living reminder of what "first class" meant on the Santa Fe. — *David R. Busse*

In the midst of restoration to its "as-delivered" appearance at the Orange Empire Railway Museum in Perris, Calif., Santa Fe FP45 No. 108 is set to debut this fall in fresh warbonnet paint. David R. Busse

8. Western Pacific F7A No. 913

'F' is for flashback

Thirty-five years ago, the idea of a "heritage unit" was so far-fetched that a group of Western Pacific employees figured there was nothing to lose when they approached company president R. G. "Mike" Flannery in late 1977 with a proposal to repaint EMD F7A No. 913 in the orange and silver from back when WP Fs pulled the *California Zephyr*. WP was down to one working F unit at the time. With new management at the helm and three of WP's four remaining cab units returning to service in fresh "Perlman green," the time was right to honor the railroad's colorful past.

In the first of many fan-friendly gestures that later included significant equipment donations to the Portola Railroad Museum (renamed the Western Pacific Railroad Museum in 2006), Flannery approved the creation of what many now consider to be the nation's first "heritage" unit. Built as Western Pacific No. 920-A in January 1950, the lead unit in the eighth of nine F7 A-B-B-A sets ordered in November 1949, EMD construction No. 8976 was one of 112 "covered wagons" delivered to WP between 1941 and 1951. Renumbered as second No. 913-A in 1971, the letter suffix was dropped in 1975 as WP's carbody unit count dwindled to single digits.

Resplendent in aluminum-and-orange lacquer that combined the freight version of the *Zephyr* scheme with the silver cab roof seen on passenger units, No. 913 returned to revenue service on the San Jose Turn on April 24, 1978. The next two-plus years saw the train become a "regularly scheduled fan trip" as photographers followed the "Fab Four" F units on their appointed rounds. As TRAINS staffer J. David Ingles noted in the December 1978 issue, "Western Pacific 913 simply is another piece of visible evidence of how a railroad company can, inexpensively, utilize the avocational interest of its employees, as well as of outside followers, to enhance its image."

Repainted again for display at the new California State Railroad Museum in Sacramento, No. 913 was donated to the museum during the facility's inauguration in May 1981. The unit remains a centerpiece of the collection today. — *Ted Benson*

Wheeling 75 loads of brand-new Fords, WP 913, two sister F7s, and a Geep streak past the old depot in Tracy, Calif., with the "Santa Fe Autos" on July 14, 1978. Think of WP 913 as "the nation's first heritage unit." Ted Benson

UP DDA40X No. 6916 awaits delivery to its new home at Union Station in Ogden, Utah, as a U30C/C30-7 pair pull through Riverside Yard on the city's south side in June 1986. Blair Kooistra

9. Union Pacific DDA40X No. 6916

Big then, bigger now!

Compared to the notable diesel locomotives that have passed into extinction, there's no shortage of preserved Union Pacific DDA40X "Centennials" around. The world's largest diesel locomotives, 47 DDA40Xs were custom-built by EMD for UP during 1969-71. No less than 25 percent of them survive today, many where you'd expect to find them (on-line at North Platte and Omaha, Neb., and Pocatello, Idaho), as well as far from their Overland Route home (Chamberlain, S.D., and Mexico City — huh?). One, No. 6936, remains active, employed on occasional special trains as part of Union Pacific's heritage fleet.

My favorite is UP 6916, in the collection of Beehive State locomotives preserved at the Utah State Railroad Museum at Ogden Union Station. Museum mates include the first SD45 built for Southern Pacific, the last operating Rio Grande SD40T-2, and the Jet Age Wasatch monster bridging the eras of the Big Boy and the Centennial: General Electric 8,500-hp "Big Blow" gas turbine 26. These locomotives all were regulars into Ogden, the Crossroads of the West and one-time gateway between UP and SP.

Sunday family drives to Ogden, and along the fabled Weber Canyon grade east of town, made an indelible impression on me as a teenager. Union Pacific was not shy in dispatching three- and four-unit sets of the nearly 100-foot-long, 6,600-hp Centennials on hotshot trains with symbols such as OMN, LAX, VAN, and SSS. It was Ogden, after all, where the first DDA40X, No. 6900, had its coming-out party in May 1969, coinciding with the 100th anniversary of the Golden Spike ceremony at nearby Promontory Summit. Just as other giant Union Pacific locomotives became known by their nicknames — Big Blow, Challenger, and most famously Big Boy — so did the Centennial.

The DDA40X was certainly as much a symbol of corporate pride to UP as Big Boy had been, bursting forth on a billboard unapologetically proclaiming "Big Then, Bigger Now!" in the late 1970s.

Geared for 90 mph, the Centennials racked up unbelievable monthly mileage figures. This ultimately increased their maintenance costs, though, and made them targets for storage in 1980 when business tanked. Twenty-five of the fleet were reconditioned in the UP shops in Omaha, Neb., and brought back out for a final year of operation in 1984. But by 1985 they had left the roster for good, except for the lucky dozen remaining today to remind us of the days when UP really did stand for "Unlimited Power."

— Blair Kooistra

10. Canadian Pacific Train Master No. 8905

Nothing beats a Train Master

As a locomotive builder, Fairbanks-Morse had a good idea. The company had long built a compact, powerful, and fuel-efficient marine diesel engine that had potential for railroad use. Admittedly, FM's opposed-piston prime mover was unusual, with twin crankshafts in an inline block and two pistons per cylinder. Within each cylinder the pistons came together to compress the air/fuel mixture and were then propelled in opposite directions when fuel ignition occurred.

FM opposed-piston engines saw experimental railroad use by the late 1930s, and encouraged by their performance, the company began producing complete locomotives at its plant in Beloit, Wis., during 1944. In 1950, the Canadian Locomotive Co. of Kingston, Ont., became a satellite manufacturing facility for FM designs.

FM and CLC offered a full line of diesel locomotives from yard switchers to streamlined cab units to road-switchers. The FM diesel engine was offered in 6-, 8-, 10-, and 12-cylinder versions with horsepower ratings from 1,000 to 2,400. In its most powerful form, the engine was installed in FM's flagship locomotive, the mighty Train Master (H24-66 in FM technical parlance). Deservedly, it received a high-powered FM sales promotion, and demonstrator locomotives toured nationwide.

When the first Train Masters appeared in 1953, their 2,400-hp, six-motor configuration was unmatched among first-generation diesels. It would take competitors Alco and Electro-Motive until 1956 and 1958, respectively, to match the Train Master's power.

Train Masters were awesome and immediate railfan favorites. They were big, could pull like the devil, and accelerate like rockets. Jersey Central; Delaware, Lackawanna & Western; and Southern Pacific employed them on commuter trains (as well as freights). Virginian's TMs, dressed in a stunning black and yellow, hauled coal. Pennsylvania, Reading, Southern, and Wabash joined in with orders. Canadian National bought a single unit, while competitor Canadian Pacific purchased 21 Train Masters in CP's classic maroon-and-gray livery.

Incredibly, only one Train Master, CPR No. 8905, is preserved. There is no Lackawanna Train Master at Scranton, nor an N&W one at Roanoke — not even an SP one at Sacramento. The sole survivor is beautifully restored and displayed at Exporail in St. Constant, Que., where it keeps company with CN FA1 No. 9400, Montreal Locomotive Works' first cab unit; CP Rail No. 4744, the only M640; and other historic Canadian diesels dating from the 1920s to a Bombardier LRC of 1983.

No other first-generation diesel could match the appeal of the Train Master, and only Exporail has one. All other contenders can fold. Nothing beats a Train Master.
— *Ken Goslett*

The only surviving Train Master, CP 8905 resides in good company at Exporail in St. Constant, Que. Ken Goslett

>> Tell us your "must see" preserved diesel at www.facebook.com/TrainsMagazine

A sight and sound that can be experienced nowhere else in the world: four RS3s work Delaware-Lackawanna train PT-98 through Gouldsboro, Pa., on May 22, 2013.

THE LAST RE

SORT

Delaware-Lackawanna's RS3s are old-school technology living and laboring in a high-tech world

Story and photos by Greg McDonnell

The Delaware-Lackawanna Railroad shop on the south side of Scranton, Pa., is unexpectedly quiet as the sun peeks over the mountains on a muggy, late-May morning. The first rays of sunlight dazzle on the sculptured carbody of a slumbering RS3 as shopman Bill Strein climbs aboard. Cab windows slide open, and from inside comes the snap of a battery switch, the clack of the fuel-pump contactor picking up, and the hum of a 400-hertz motor-generator set supplying 115-volt, 400-cycle current to the excitation panel. Seconds later, the 12-cylinder, 1,600-hp Alco 244 engine beneath the hood of D-L No. 4068 cranks over without hesitation and surges to life.

Strein moves quickly to the next unit — another RS3 — and repeats the process, rousing a second 244 engine. A minute or two later, he cranks up another RS3, and yet another! In less than 10 minutes, four RS3s are coupled together and idling contentedly in front of the Scranton shop. It's a sight and sound that can be experienced nowhere else in the world.

Few operable RS3s remain. Other than a pair on the lightly trafficked Battenkill Railroad in upstate New York, most are in museums. But no one — museum or otherwise — can lash together four operating 244-powered RS3s. No one, that is, other than Delaware-Lackawanna.

Meet "the girls of summer," as David Monte Verde, president of D-L parent Genesee Valley Transportation, calls the quartet. It's an affectionate term born of the fact that the four oldest members of GVT's all-Alco fleet often spend the winter in hibernation. Not for the sake of any pampering, but because D-L's motive power requirements are reduced during the winter months and the RS3s, whose 6SL air-brake equipment is incompatible with most of the bigger locomotives in the fleet, are less likely to be needed.

Chief Mechanical Officer Don Colangelo in the cab of Central Railroad of New Jersey 1554: manual transition, Amplidyne excitation, and components in common with Boeing B17 bombers of World War II.

They might be well past retirement age and candidates for preservation, but the four RS3s burbling on the Scranton shop track are no museum pieces. These working locomotives earn their keep. On this May 2013 morning, the 60-year-old-plus Alcos are called for Scranton-Slateford Junction, Pa., road freight PT-98, a 118-mile round trip to interchange traffic with Norfolk Southern.

A scene straight out of the 1950s, Nos. 4068, 4103, and 4118, delivered to Delaware & Hudson in 1952, retain their original road numbers and wear a tastefully adapted D-L version of their '50s-era D&H black-with-yellow-zebra-striped ends. Sister 1554, turned out of Schenectady in April 1953, has been restored to her green-and-yellow Central Railroad of New Jersey colors, complete with Jersey Central Lines "Miss Liberty" heralds.

There's no denying GVT's appreciation of history and a certain corporate affinity for the old girls, particularly on the part of Chief Mechanical Officer Don Colangelo. [See "The Alco Doc and His Piano," TRAINS September 2012.] But the decision to purchase and operate the RS3s was all business.

"They were cheap," Colangelo says. "They were cheap, we had parts, and we knew how to fix them." Know-how is everything in the Alco business, and few people, if any, know more about Alco locomotives than Colangelo. Exhibit A: the smooth-running 12-244 in No. 4068, muttering quietly to itself just inches away. When 4068 arrived on the property in 2007 the prime mover was seized. "They said this engine would never run again," Colangelo recalls. "We just laughed."

"My guys can fix anything"

On a test run, No. 4068 joined sisters 4103 and 4118 in pusher duty, assisting a grain train up the hill out of Scranton. In the process of tracing a water leak that developed during the workout, Colangelo noticed a strange ticking and unusual motion in the No. 6 cylinder while barring the engine over by hand back at the shop. Investigation revealed that someone had installed an incorrectly sized bearing. "This thing had been hammering away like that for who knows how long," Colangelo exclaims. "And we'd just pushed an 80-car grain train. Don't let anyone tell you the 244 is fragile!"

One of the most respected authorities in the fraternity of Alco operators, Colangelo is quick to stress that maintaining GVT's world-renowned fleet — everything from S6 to C636 — is a team effort. "I'm just the bandleader," he says with unabashed pride. "My guys can fix anything."

With an unmistakable sense of urgency and determination, Colangelo and the shop crew prepare the RS3s for their PT-98 assignment. The crew quickly re-marshals the

The sweet sound of Alco 244s echoes through the forest as PT-98 rounds a curve east of Cresco, Pa., in May 2013.

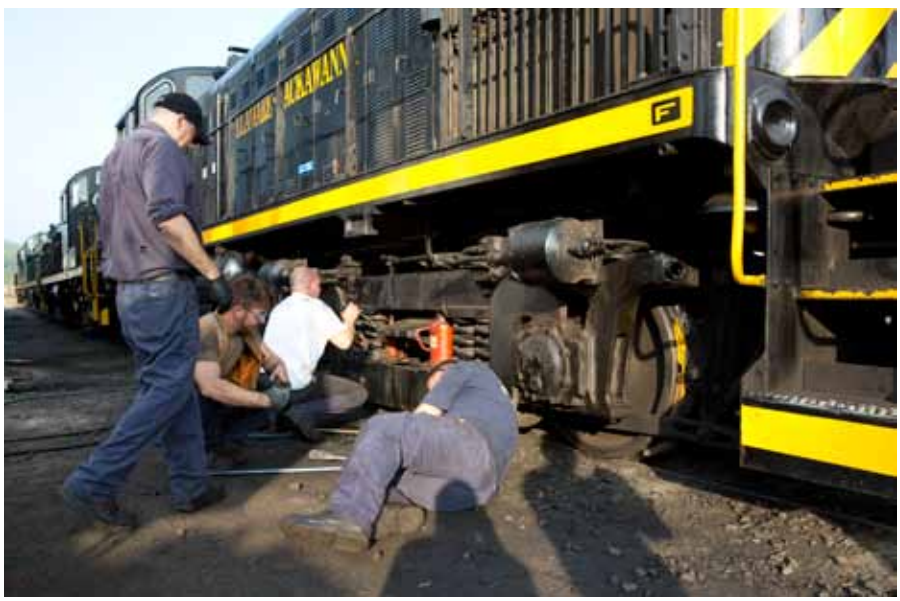
consist to place CNJ No. 1554, the only one of the four locomotives without dynamic brakes, in a trailing position. They plug in the m.u. cables, test the brakes, check the fluid levels, and take the set for a quick sprint on the shop lead to ensure that all locomotives are responsive and loading.

"It's always something," Colangelo mutters as he climbs down from the 4068. CNJ 1554 is low on water, there's a leaking brake-cylinder packing-cup on the lead truck of 4118, and a broken bolt on the equalizer of the No. 1 truck on 4068.

Colangelo and his men move in with precision and coordination befitting a NASCAR pit crew. Billy Birdsall grabs a water hose and climbs atop the 1554 to slake the Jersey girl's thirst; Strein and Micah-John Kirstner have 4118's leaking brake-cylinder pulled apart by the time Colangelo returns from the shop with a new packing-cup. The crew barely utters a word. Everyone knows just what to do. Jacks, crowbars, and wrenches come out as all four men tend to the equalizer on 4068.

Less than 50 minutes after the first 244 cranked over, the four RS3s are good to go.

Normally, PT-98 would draw "newer" Alco Centuries and MLW M-Lines, but circumstances have conspired to put the girls of summer — all four of them — on the Portland Turn. More likely to be found on locals to Carbondale or on the once-electrified Laurel Line, the RS3s can — and do — handle any job the D-L might throw at them, from solo work to ganging up with all the horsepower the shop can muster to move grain trains over the Pocono Mountain summit. "There is no light duty on this railroad," Colangelo asserts.



With precision and coordination befitting a NASCAR pit crew, the Scranton shop force tends to a broken equalizer bolt on D-L No. 4068. Left to right: Don Colangelo, Micah-John Kirstner, Bill Strein, and Billy Birdsall.

PT-98 engineer Richard Janesko is a little more than a week away from retirement. Richie, as everyone calls him, doesn't complain about the prospect of working one of the closing days of his 40-year railroading career on locomotives that were already

>> See from-the-cab video footage of D-L RS3s. Visit www.TrainsMag.com/Locomotives

Making like it's 1955, PT-98 cruises along the banks of Roaring Brook, east of Scranton, on the fabled "Route of Phoebe Snow."

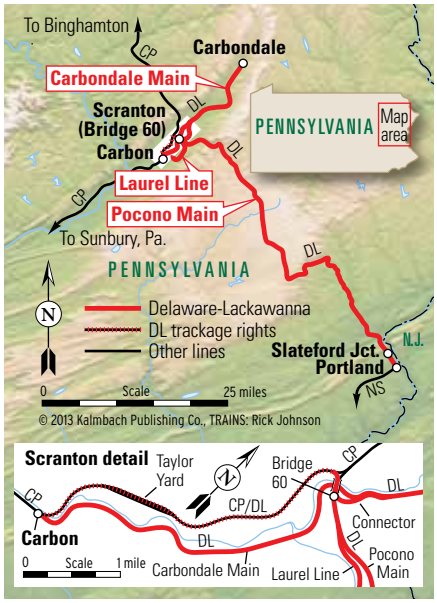
Engineer Richard Janesko closes out a railroad career on locomotives that were already old when he went to work for Erie Lackawanna 40 years ago.

considered well past their prime when he signed on with Erie Lackawanna in 1973.

They're old, Janesko emphasizes as he notches back the throttle. He's well acquainted with their limitations, from their awkward long-hood forward configuration, to the idiosyncrasies of the 6SL brake with its lack of a pressure-maintaining function, to manual transition. A primitive feature that disappeared from locomotives more than three generations ago, manual transition is — for those not old enough to remember — exactly what it sounds like: it's the diesel-electric locomotive version of a standard-shift transmission.

Janesko pauses long enough to grab a couple more notches on the throttle. He continues the conversation with one hand on the throttle as 6,400-turbocharged 244 horses growl in throaty response, and the other hand on the transition lever. "Believe it or not," he says with a contemplative smile, "these are pretty good engines."

The raspy vocals of four laboring 244s bounce off the walls of Nay Aug Tunnel



and echo up the forested canyon traced by Roaring Brook as PT-98 charges upgrade on the Pocono Main. Once Delaware, Lackawanna & Western's fabled, multiple-tracked "Route of Phoebe Snow," the line is a single-tracked shadow of its former self, but as scenic and spectacular as ever.

Four RS3s! The girls of summer go marching past cast-iron mileposts that still measure the distance to Miss Phoebe's Hoboken Terminal on the Jersey side of the Hudson River; past the concrete shells of long-abandoned interlocking towers; past rusting, empty-eyed signals that once urged on the likes of the *Merchants Express*, the *Owl*, and the *Phoebe Snow*, and hotshot freights handling reefer traffic and merchandise freight bound for Hoboken docks and Hudson River carfloats. Four RS3s making like it's 1955, but all the more incredible because it's 2013.

Their 60th birthdays behind them, the girls of summer are a contradiction in this world of EVOs and ACes, A.C. traction, and multiprocessor-minded locomotives. D-L's RS3s are old-school technology living and laboring in a high-tech world. In defiant contravention of all odds, they toil on, hauling freight and racking up revenue miles to the four-cycle beat of model 244 prime movers designed by Schenectady engineers in 1944-45, working with manual transition and Amplidyne control equipment that includes an excitation panel employed in the gun turrets of Boeing B17 bombers during World War II.

Sixty and counting, the girls of summer still have what it takes.

Where "Miss Phoebe" once boasted a station, tower, and multiple-tracked main line, the Portland Turn's four RS3s accelerate westward under a canopy of trees at Analomink, Pa.

Ask Locomotive

On Union Pacific SD70ACe No. 8451 (top), you can see air intakes on its equipment box behind the left-hand side of the cab. Norfolk Southern SD70M-2 No. 2720 doesn't have this feature. Two photos, Greg McDonnell

Q How do I tell the difference between an EMD SD70ACe and an SD70M-2? — *SPCDANW2021, "Locomotives" section of the* TRAINS *forum, www.TrainsMag.com*

A In an effort to streamline manufacturing processes, locomotive builders have standardized components and carbodies of various models wherever possible. Externally, the SD70ACe and the SD70M-2, its D.C.-traction cousin, are all but indistinguishable.

The most noticeable difference is in the large equipment box behind the cab on the left side of the locomotive. On the SD70ACe, this box is fitted with two elongated panels with air intakes for A.C. traction equipment. Those panels are not present on the SD70M-2. Of course, if you are on the right side of the locomotive, this spotting feature is of little help.

Road numbers are the most effective and certain method of distinguishing between the two models. As the saying goes, you can't tell them apart without a program. — Greg McDonnell

Q On the July 2013 cover of TRAINS, the combined *Super Chief/El Capitan* waits to depart. How was the steam carried from the FP45 to the train with what looks like an F45 (blue-and-yellow unit) in the locomotive consist? Did the Santa Fe install steam pipes on the F45?
— Matthew Young, Mountain View, Calif.

A Yes, when railroads made the transition from steam to diesel, almost all passenger equipment was heated by steam, something steam locomotives had in ample supply, but diesels did not. Diesel locomotives used in passenger service were thus equipped with steam generators designed to produce and deliver steam to the train. These steam generators were typically located in the rear of carbody locomotives (as in the FP45), and in the short hood of road-switchers. Steam lines and piping that ran the length of the train supplied steam to the train, much the same as the air-brake lines. Steam-line couplings were necessarily more complex, and unlike air-lines, needed to be carefully coupled and uncoupled by carmen. In order to allow locomotives without steam generators to work in passenger service, many railroads equipped dual-service units with pass-through steam lines, as is the case with the Santa Fe F45 pictured on the July cover.
— Greg McDonnell

Q Why is the cab door on the right side of newer GE ES44s?
— Borislav Miletic, Temerin, Vojodina, Serbia

ES44AC: "Exit stage right." Tom Danneman

A In 2006, the Federal Railroad Administration amended its regulations to require an increased level of crashworthiness on locomotives manufactured or remanufactured on or after Jan. 1, 2009. GE modified the Evolution Series design to accommodate this increased level of crashworthiness through changes in the operator cab and nose design, incorporating larger crash posts and a more substantial cab structure. Given that the nose-cab door changed significantly (and increased in total weight), GE engineers flipped the door position in the nose for increased safety. In the unlikely event of a crash and rollover onto the engineer's side (obstructing the rear door), the nose cab door could be easily opened "outward/downward" to exit the locomotive from the front. — *Greg McDonnell*

THE LONDON LOOK

by A. Ross Harrison

The legacy of Electro-Motive's Canadian subsidiary General Motors Diesel (later known as "Diesel Division of General Motors of Canada") will live on in the thousands of locomotives that left the London, Ont., plant to work the high iron around the globe. The specs for an F unit, Geep, or an SD from London were pretty much the same as those from La Grange, Ill., but the Canadian cousins had a different flair.

From the obvious, such as builder's plates marked "GMD," or "Diesel Division," and truck frames forged in the Hamilton, Ont., mills of Dofasco; to headlights notched into the low nose, and bells mounted front and center between the numberboards (with no characteristic round chin under it) and bracketed by tricolor classification lights. To borrow a line from the advertising world for women's cosmetics, the "London look" might be fading, but it has cast an enduring shadow.

CP SD40-2 No. 6005 (left) shows off the "London look," headlight notched in its low nose and high-mounted bell. Above, Dofasco-forged trucks, another hallmark of generations of London-built GMDs. Two photos, A. Ross Harrison

Knoxville Locomotive Works: *Exceeding Market Expectations for Locomotive Repowers*

The KLW 24B 2400 BHP Road Switcher
Emit Less - Consume Less - Do More

Knoxville Locomotive Works (KLW) presents the KLW 24B, a single-engine repower package that reduces emissions, uses less fuel, and hauls more carloads compared to an unaltered GP38-2 locomotive.

MTU Series 4000 12V 2400 BHP Prime Mover

- **Tier 3 Certified/Meets ULEL Emissions Standards**
- **Lowest Diesel Particulate Levels in the Industry Without Aftertreatment**
- **Up to 25% Fuel Savings Engine to Engine**

TMV Electronic Control System

- **Increases Tractive Effort by 35%+**
- **AESS Decreases Fuel Consumption by 12-18%**
- **Locomotive Hauls More Freight & Uses Less Fuel**

KLW 24B: Performance Breeds Confidence

- **4 year/12,000hr Mechanical Warranty Parts & Labor**

Learn more at goklw.com or call 865-525-9400 ext. 22

G&O mtu

Low Emissions • Fuel Efficient • Cost Effective

Knoxville Locomotive Corp., 422 W. Cumberland Ave, Knoxville, Tn. 37902, 865 525-9400


For Sale or Lease!
Sterling Rail
Locomotives
4061
4061
~~(5)~~ (3)
B23-7s
• Daily Runners
• Very clean & in excellent running condition
Call for Pricing
Location: OK
~~(12)~~ (7) SD40-2s
• All Units Remanufactured by ALSTOM in 2001!
• 16-645E3B & 16-645E3 Engines
• D-78 TMs
• 26L Air Dynamic Brakes
• AR10 Main Gen
Call for Pricing
Location: Chicago, IL
~~(10)~~ (5) Switchers
(3) SW8s, (1) SW9
& (1) 65 Ton Switcher
Price: Just Reduced!
Call for Pricing
Locations: CO, IA & Canada
~~(2)~~ (1) GP38
#3811
Price: $225,000
Location: IL
~~(6)~~ (3) GP40s
Price: $190,000
Location: IL
...and much more!
STERLING RAIL, INC.
www.SterlingRail.com • (512) 263-1953 • info@SterlingRail.com
© 2013 Sterling Rail, Inc. | www.SterlingRail.com | Phone: 512-263-1953 | Fax: 512-263-9799 | 2905 RR 620 North | Austin, TX 78734