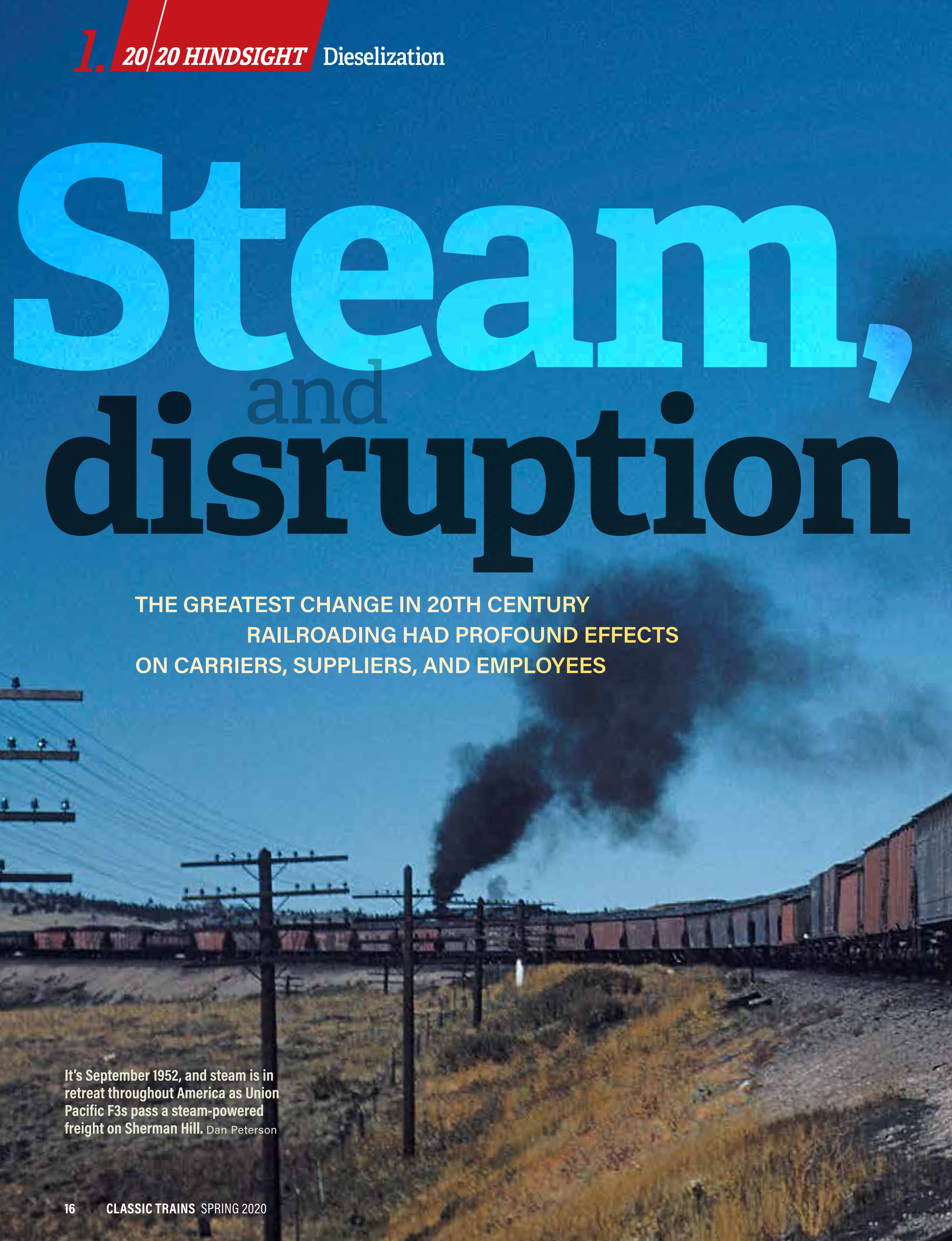
Steam, and disruption

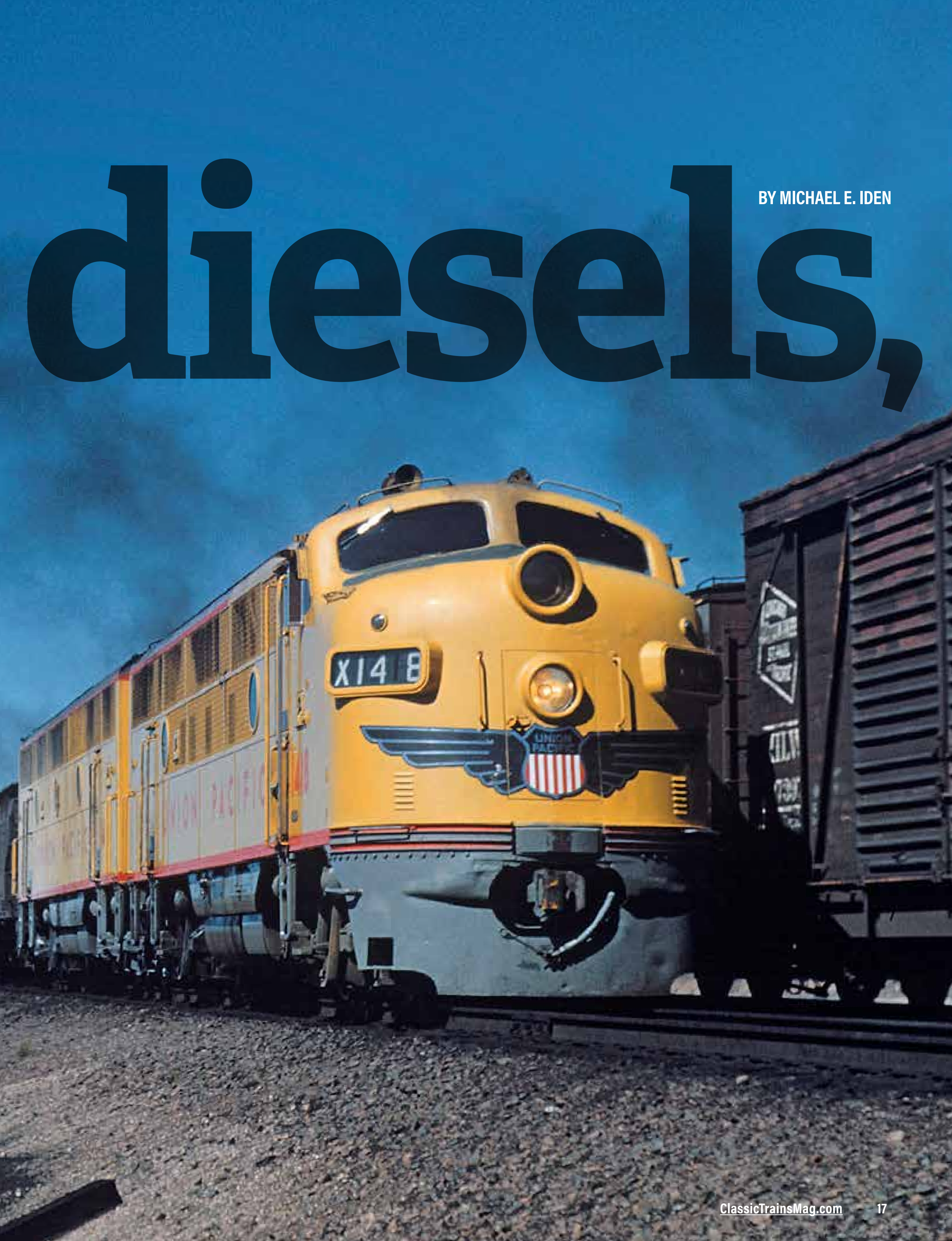
THE GREATEST CHANGE IN 20TH CENTURY RAILROADING HAD PROFOUND EFFECTS ON CARRIERS, SUPPLIERS, AND EMPLOYEES

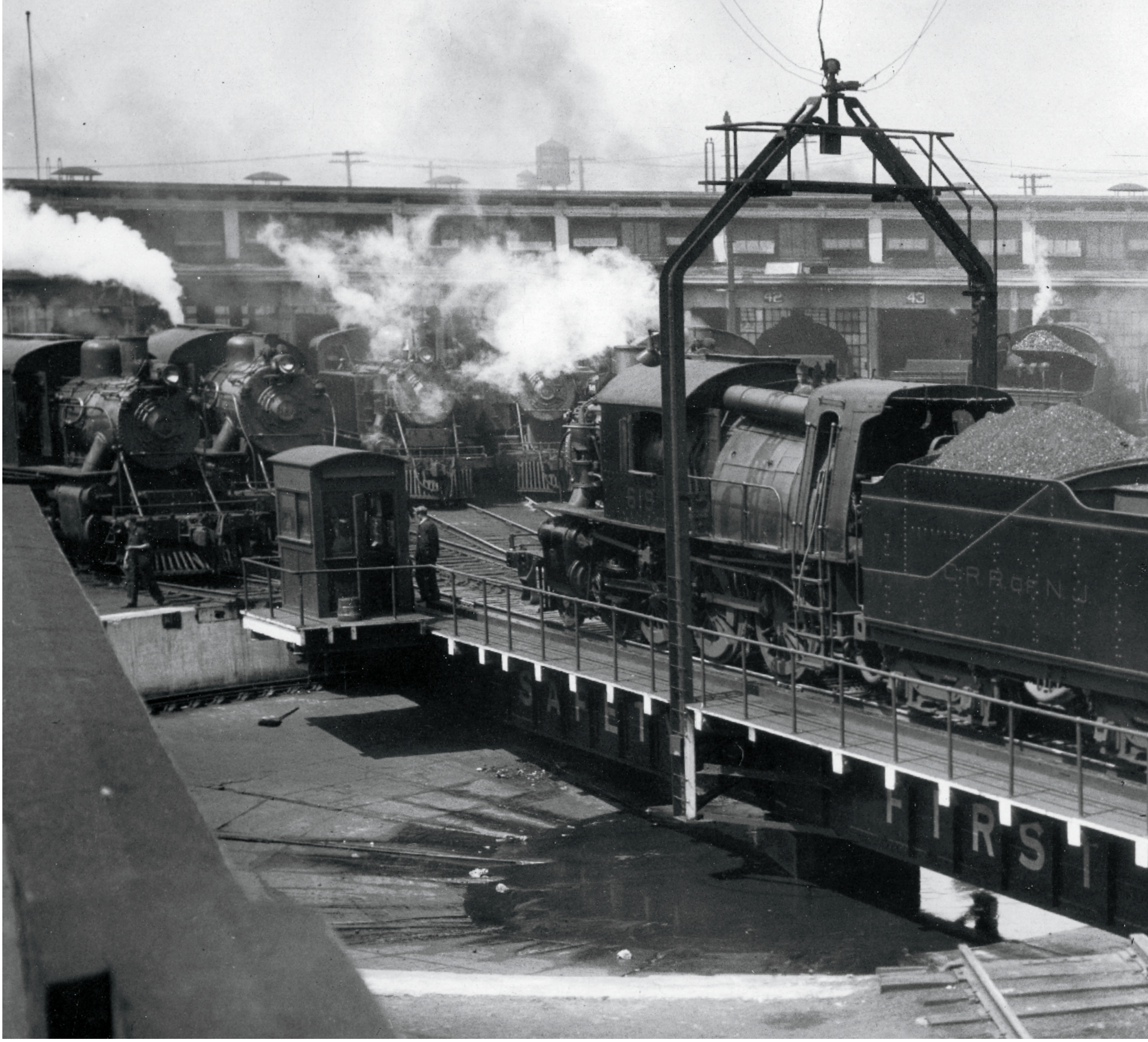


It's September 1952, and steam is in retreat throughout America as Union Pacific F3s pass a steam-powered freight on Sherman Hill. Dan Peterson

diesels,

BY MICHAEL E. IDEN





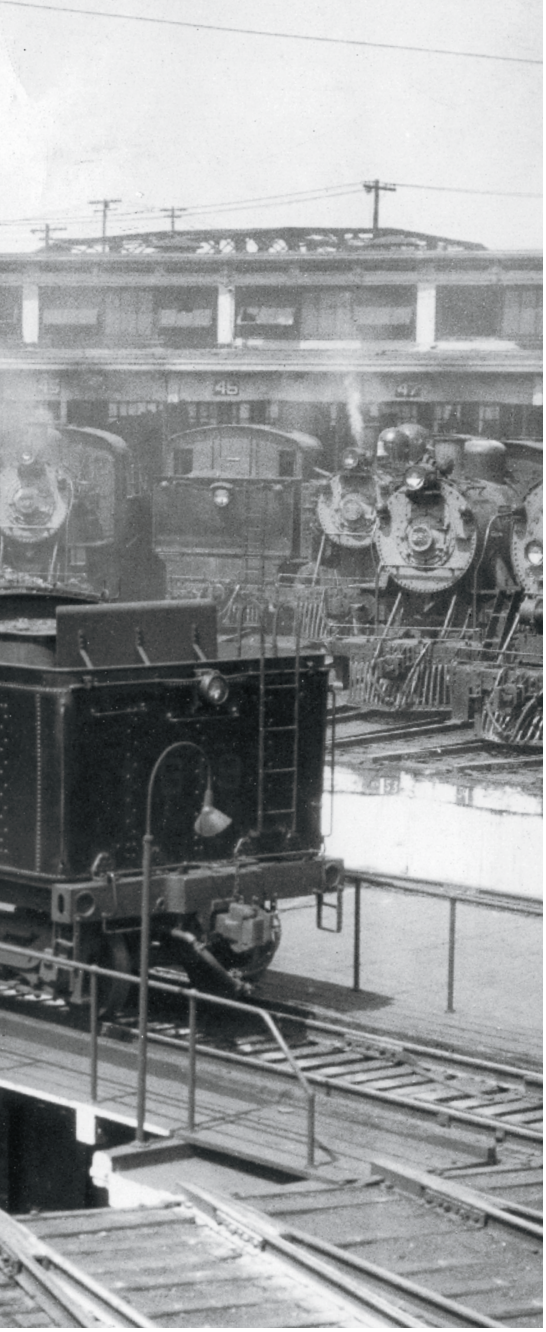
The magnificent inefficiency of steam is evident in this view of part of Jersey Central's sprawling engine terminal at Jersey City. Ewing Galloway

Locomotive builders and railroads have always been closely linked in a unique supplier-and-customer relationship. Railroads in the 20th century depended on steam locomotives for the first 60 or so years, on diesels for the last 40. While the railroads were successful in transitioning from steam to diesel power, the steam builders all eventually failed and left the market. The newcomer that successfully commercialized diesels (at steam's expense) prospered, but then lost market share to another diesel newcomer.

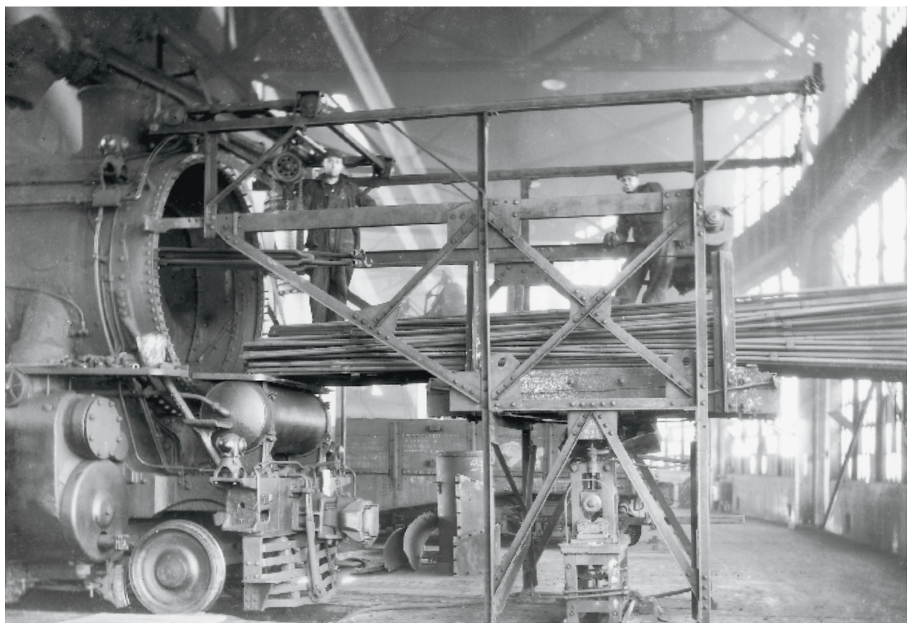
Rudolph Diesel's first engine operated in 1893, and by 1898 brewer Adolphus Busch had a diesel engine providing electricity for his St. Louis brewery. But early diesel engines were too large and heavy for the small power they generated to be useful as locomotive power plants. Practical diesel locomotives were still a decade away.

The dawn of the 20th century saw America emerging from the "Gilded Age" of rapid economic growth, increasing industrialization, and an expanding railroad network. Philadelphia's Baldwin Locomotive Works, established in 1832, was the nation's dominant locomotive builder. After 69 years, however, competition strengthened in 1901 when 10 smaller producers were merged to form the American Locomotive Co., making Alco an equal to Baldwin in manufacturing capacity. Until steam orders dried up in the late 1940s, the two builders roughly divided most of the industry's sales.

Baldwin's manufacturing capacity and expertise were unprecedented. Early 19th century railroads were small, undercapitalized, marginally routed, poorly constructed, often quickly bankrupted, and knew nothing about locomotive performance. However, after the Civil War, railroads matured and increasingly adopted military management styles, leading to the rise of in-house locomotive experts known as "master mechanics" (who later evolved into "chief mechanical officers"). The master mechanics quickly developed personalized formulas and preferences (mostly "art" and a little "science") for lo-



Visitors tour the Baldwin manufacturing plant at Eddystone, Pa., in the 1930s. Built just as steam orders crested, Eddystone was an underused monument to the past. H. L. Broadbelt coll.



Steam maintenance was highly labor intensive, as illustrated by these workers changing superheater tubes on a PRR 4-8-2 at Crestline, Ohio. Henry C. Burkhart, William Ayers collection

comotive design. Railroads soon requested bids from builders for their own specific designs; the builders struggled to outbid each other based only on price and delivery dates.

Railroads had no practical alternative to steam and never questioned the labor intensiveness or high cost of operating and maintaining steam locomotives. Engines were often assigned to individual crew districts, stopping for coal and water several times during a crew's trip across roughly 100 miles. On arrival at the terminal, a steam locomotive required several hours of work to prepare for its next assignment. Ash pans had to be emptied after each trip. Boilers had to be washed monthly (or more often) to remove mineral scale. Smokeboxes accumulated cinders. Boiler tubes wore out and leaked, requiring laborious replacement. Boiler shells developed cracks. Fireboxes failed. A nationwide army of railroad employees operated facilities to accumulate, chemically treat, and distribute boiler water. Railroads frequently provided water to entire towns, and Santa Fe often moved trainloads of boiler water across the arid Southwest. One of every 10 carloads of coal were used to fuel steam locomotives.

APEX OF STEAM PRODUCTION

The Interstate Commerce Commission (ICC) doubled down early in the century on railroads with extreme economic regulations. Overregulation stagnated the railroads and they began a long decline eventually worsened by the Great Depression. It wasn't until 1980 with passage of the Staggers Rail Act, greatly decreasing ICC oversight, that the decline was halted and reversed. Reinforcing the point at the start of this article about the relationship between steam locomotive builders and railroads, both industries began their declines in this era. But Baldwin appeared blind to how the world was changing. The oldest and dominant builder, it had accepted orders in 1905 from railroads for an all-time record 6,000 locomotives. After 1905, however, annual sales for all locomotive builders fell and never recovered; the apex of steam locomotive production had been reached.

Further evidence of Baldwin's management missteps is that it made two big mistakes at and shortly after the turn of the century. In response to what appeared to be never-ending growth of the locomotive business, Baldwin's owners overestimated future sales and invested heavily, expanding its original Broad Street plant in Philadelphia in 1898. Then in 1906, the peak year of production when 2,666 steam locomotives were assembled, Baldwin began building a massive new plant in suburban Eddystone, Pa. As has happened in many industries, Baldwin's expansions were ill-timed and created a huge excess of production capacity.

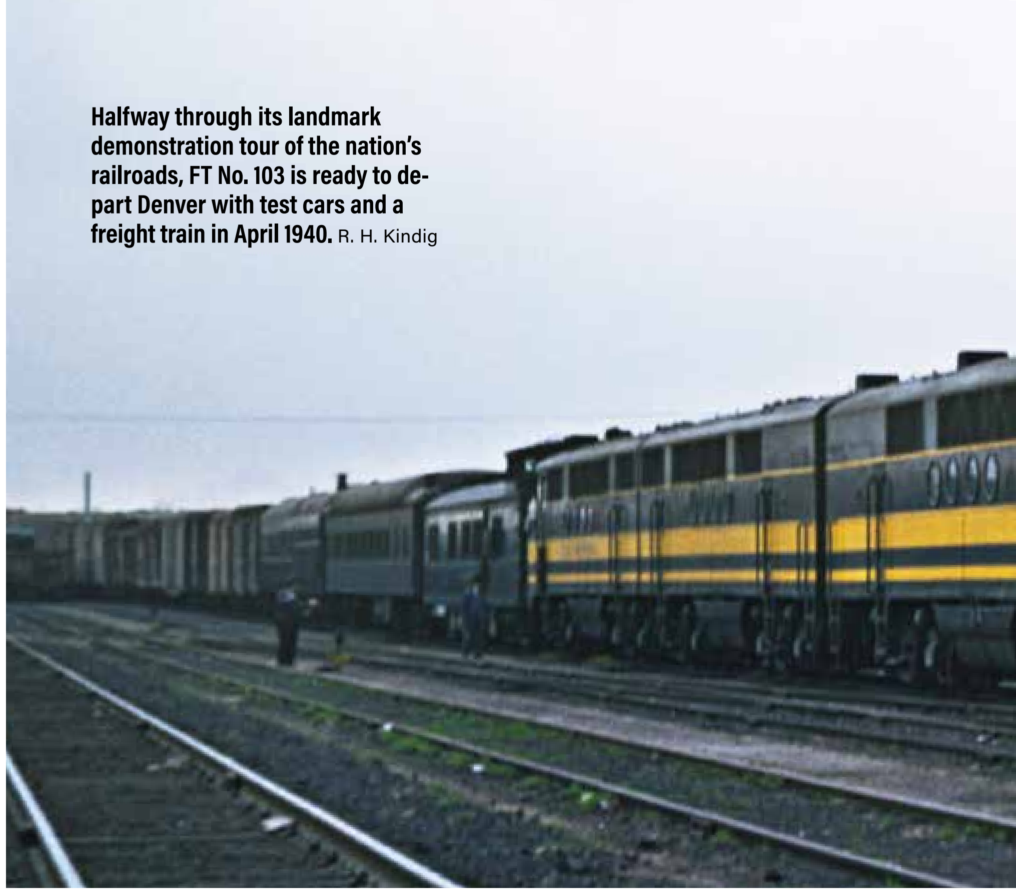
Even though Baldwin was an early adopter of parts standardization, it remained a "job shop," building batches of locomotives to railroad-specific specifications. Very few railroads copied or accepted another road's locomotive design. This prevented Baldwin from fully realizing the economies of mass production, a deficiency that lasted into and fatally crippled its brief attempt at building diesels.

Baldwin remained true to its steam heritage to the end. Its last steam locomotive was delivered in 1949, well into general dieselization, and its last production diesel left Eddystone just seven years later. Total dieselization of large U.S. railroads was still four years away; Baldwin wasn't around as a locomotive builder when it happened. (Successor Baldwin-Lima-Hamilton became a manufacturer of construction and road machinery until it was corporately dissolved in the 1960s.)

The government takeover of U.S. railroads during World War I forced some standardization of steam locomotive designs (initially resisted by Baldwin), but after United States Railroad Administration control ended in 1920, the carriers to a great extent reverted to ordering custom designs, in decreasing numbers.

A change in steam technology then dealt yet another blow to the sales books of Baldwin and other steam builders; the firms actually created this challenge by offering radically new steam concepts. The new designs were both more powerful and physically bigger than their predecessors. This shift toward ever larger and more powerful (but fewer) new locomotives forced the builders to maintain factories with larger production floor spaces not so much for meeting sales volumes but simply to accommodate longer boilers and running gear on the factory floor.

And then came "Black Tuesday," October 29, 1929, when the stock market crashed. As American industries reduced



Halfway through its landmark demonstration tour of the nation's railroads, FT No. 103 is ready to depart Denver with test cars and a freight train in April 1940. R. H. Kindig

Jersey Central No. 1000, the 1925 Alco-GE-IR box-cab hailed as the first commercially successful diesel-electric, switches at the road's Bronx freight terminal. Frank DiFalco collection

Baldwin's first diesel, also built in 1925, was a 1,000 h.p., 137-ton road engine. No. 58501 tested briefly on the Reading, then returned to Eddystone, where it was scrapped in 1941. Baldwin

output, and people traveled less, railroad profits nosedived from about $1 billion in 1929 to a $122 million *loss* by 1932. Overall, U.S. railroads lost money for eight years until 1937. Many carriers went bankrupt, some not being reorganized until after World War II.

AUTOS, TRUCKS — AND DIESELS

The Great Depression took a heavy toll on average Americans, but it was preceded by another technological change that adversely affected the railroads: the increasing number of automobiles, trucks, and buses on America's ever-growing network of improved streets, rural roads, and highways. The decline of passenger and freight business, combined with local concerns about coal smoke and regulations curtailing the use of steam locomotives, combined to foster development of alternative locomotives, setting the stage for dieselization.

The diesel-electric locomotive had been lingering on the margins of railroading for years. The biggest constraint (other than railroad attitudes toward something other than steam) was that early diesel engines were relatively large and heavy while producing only small amounts of power. The first U.S. locomotive powered by an internal-combustion engine (a 175 h.p. gasoline engine) was completed in 1913 by General Electric in Erie, Pa.

Burlington's *Pioneer Zephyr*, the first diesel streamliner, is poised to embark on its famous nonstop dash from Denver to Chicago on May 26, 1934. CB&Q

In March 1917, GE's first experimental diesel locomotive began switching at the Erie plant, using a 225 h.p. engine that weighed almost 7 tons. The engine's power-to-weight ratio was poor, 32 h.p. for every pound of engine weight. By comparison, a GE 4,400 h.p. engine of today has a power-to-weight ratio of about 220:1.

GE's first experimental diesel was followed by its first commercially produced diesel-electric, sold to the Jay Street Connecting Railroad in New York City in September 1918. The Jay Street locomotive was notably unreliable, however, and soon was refitted with a gasoline engine.

In 1922, the Electro-Motive Engineering Corp. was formed in Cleveland to design and sell self-propelled rail cars (powered by Winton Engine Co. gasoline engines mated with GE electrical gear and assembled by St. Louis Car Co.) to provide railroads with lower-cost equip-

Switchers and the first E units take shape in Electro-Motive's brand-new diesel-locomotive assembly plant near Chicago in 1937. EMD

ment to replace steam locomotives and conventional passenger cars on branch lines being decimated by auto and truck traffic. At this point, the fledgling EMC was focusing solely on the branchline railroad passenger market. Electro-Motive's entrance into the rail equipment market put it clearly in the footprint of being a future "disruptive innovator," starting with a product too small or underpowered for the largest customers (railroads moving freight trains) and later quickly surpassing the established steam builders.

Baldwin entered the diesel-electric arena in June 1925 when it released experimental locomotive 58501, weighing over 137 tons and powered by a twin-crankshaft, 12-cylinder, 1,000 h.p. engine. The 58501 established Baldwin's future thinking about road diesels: large and heavy. Baldwin could never be faulted for "thinking small."

Almost simultaneously, a partnership of American Locomotive, GE, and Ingersoll-Rand began delivering a line of 300 h.p. 60- to 100-ton box-cab diesel switchers. These became the first semi-production diesel locomotives. Alco provided the trucks and carbody, GE the traction motors and electrical gear, and Ingersoll-Rand the engines. The units were mostly used in heavily populated urban areas: New York City and Jersey City/Hoboken on the Erie, Long Island, and Jersey Central; Baltimore on the B&O; and Chicago on the Chicago & North Western, all municipalities where anti-smoke ordinances were forcing out steam locomotives. After only three years, however, Alco withdrew from the partnership and started its own diesel locomotive program.

LIGHTWEIGHTS LEAD THE WAY

The greatest boost for diesel power during this era was the entrance of lightweight streamlined articulated trains such as the Burlington's 1934 *Pioneer Zephyr*, which used lightweight engines from Winton Engine Co. (General Motors had purchased both Electro-Motive and Winton in 1930.) Winton had progressively broken through the power-to-weight barrier with its engines, raising the power output to levels needed for railroad propulsion while shedding weight from the engine.

In 1935, Electro-Motive had five 1,800 h.p. twin-Winton diesel engine box-cab locomotives assembled: two as EMC engineering test beds, one as Baltimore & Ohio No. 50, and two to power the Santa Fe's new *Super Chief*. These were the very first non-articulated diesel locomotives designed for higher-speed mainline service. And they were capable of multiple-unit control, with two or more being coupled together and controlled by a single engineer. If a train required more power than a single unit could provide, a second was added to produce 3,600 h.p.

Baldwin reacted in 1935 to Electro-Motive's progress by publishing an article in its magazine with the title "Muzzle Not the Ox That Treadeth Out the Corn," a biblical quote from Deuteronomy 25:4, advising railroad managements to not abandon steam power. Baldwin would have been better served considering Proverbs 1:2, "When pride comes, then comes disgrace, but with humility comes wisdom."

The modular approach of the passenger box-cabs led to Electro-Motive's four-unit, 5,400 h.p. FT freight locomotive in November 1939. FT No. 103's 11-month, 35-state, 83,764-mile demonstration tour proved the diesel's ability to handle the toughest assignments in railroading. Soon after the end of the FT's tour, in January 1941, Electro-Motive Corp. became the Electro-Motive Division of GM.

Electro-Motive's first customer for FTs, in 1940, was the Santa Fe, which put the locomotives to work on its transcontinental main line through the desert. This was Santa Fe's toughest locomotive

Baldwin's smoky, steam-era shop at Eddystone, Pa., hosts mammoth 2-D+D-2 "Centipede" passenger diesels in the late 1940s. Baldwin

territory because of the climate, the grades, and the extreme shortage of good water for locomotive boilers.

Few railroaders — and none of the steam locomotive builders (especially Baldwin) — foresaw or recognized Electro-Motive's rapid success. The Pennsylvania, for decades a leader in the industry, repeatedly resisted Electro-Motive.

Diesels reduced railroad operating expenses, but also disrupted and brought massive change to railroads, one of the oldest, most insular, and hidebound industries. Dieselization could be described as a "gale of creative destruction," a term coined in 1942 by the Austrian economist Joseph Schumpeter, who studied entrepreneurship and technological change. Schumpeter saw innovative technologies as creating massive and quick turmoil in established industries, usually creating "winners and losers."

As author Wallace W. Abbey has observed, the FT was technologically an evolutionary locomotive. But more than any other diesel locomotive, the FT unleashed revolutionary winds of change among railroads and locomotive builders. Electro-Motive had designed the FT as a replacement for the biggest steam locomotives of the day. But cumulative power turned out to not necessarily be its most important feature.

The FT quickly scored five points with the railroads against steam (and steam locomotive builders):

1) The FT (and its replacement parts) were mass-produced, like parent GM's automobiles. Compared to steam, diesel locomotives were more expensive to acquire, but more versatile and much less costly to operate and maintain. Railroad financial officers quickly grasped this advantage (railroad mechanical officers, unfortunately, weren't always as quick).

Electro-Motive's entry into the rail equipment market put it in the footprint of being a future "disruptive innovator."

2) While Baldwin in particular struggled with excess capacity, Electro-Motive carefully added capacity at La Grange, Ill.; Chicago; and Cleveland to match orders, keeping its production costs low and enabling low selling prices.

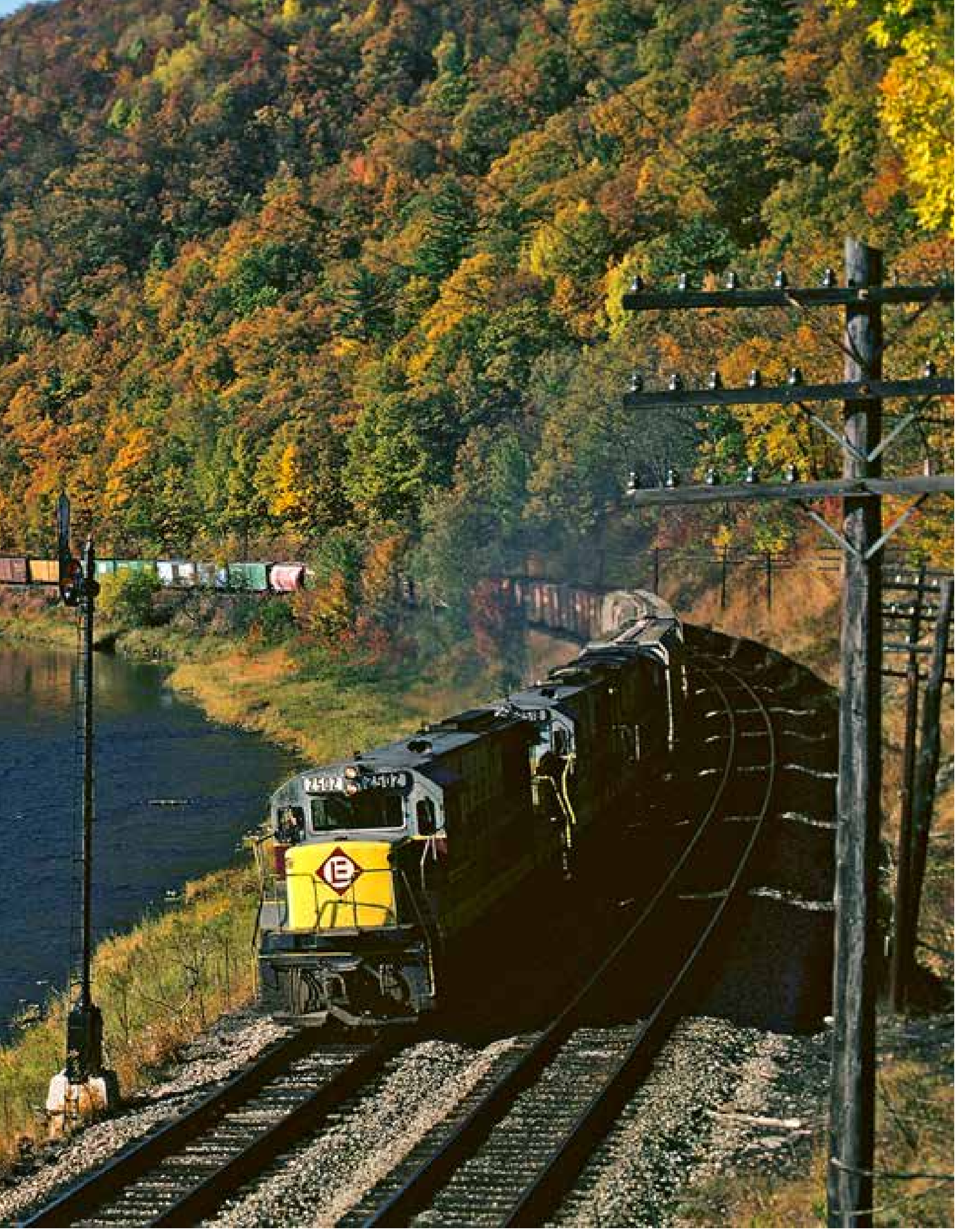
3) Diesels were modular, enabling two FT units to replace a 2-8-2 today, and four FTs to replace a 2-10-4 tomorrow. This shattered the entire reason for steam's evolution into the Super Power era.

4) Federal restrictions on production during World War II briefly halted all diesel locomotive production, but Electro-Motive quickly transitioned into defense production, particularly making 567-series engines for Navy ships. When the restrictions were eased, EMD became the only wartime manufacturer of diesel road units; Alco and Baldwin could only build diesel switchers in addition to steam locomotives. And those builders' diesel-engine development programs remained "on hold" until the war ended, placing their engines at a reliability disadvantage compared to EMD's.

5) The steam builders ignored the threat posed by diesels until it was too late to compete with EMD (in the case of Alco) or hopelessly late (for Baldwin). Alco survived dieselization, briefly becoming the Number 2 builder, but it never gained enough market share to sustain the business, succumbing in 1969 after GE had entered the market as an integrated locomotive builder.

Of all the advantages of diesels, reductions in operating and maintenance costs were the most important to railroads. Even the most advanced steam locomotives were ultimately unable to beat the bottom-line expenses of EMD diesels.

On an energy-equivalent basis (con-



Two decades after Electro-Motive jolted the railroads into dieselizing, GE challenged EMD with its U25B, two of which head an Erie Lackawanna train near Long Eddy, N.Y., in 1974. Mike Nelson

verting the energy content of coal and crude oil used to fuel steam locomotives into the energy equivalent of diesel fuel), American railroads in 1945 used about eight times as much energy as they do today, while producing less than one-half the gross ton-miles of work. This was due to the extremely low thermal efficiency of steam locomotives, which typically waste about 95 percent of any fuel's energy content.

As for railroad jobs, dieselization brought massive change, mostly negative. A quick look at railroad employment between 1940 and 1960 shows how dieselization transformed railroad mechanical departments and shop towns. In 1945 U.S. railroads employed 1.4 million workers; by 1960 the figure was below 800,000 — a 43 percent decline. Some of the biggest job losses in shops were due to dieselization.

Two traditional locomotive-shop crafts were hit particularly hard, while a third benefited. Boilermakers, which maintained the most expensive part of steam locomotives, saw their employment drop 78 percent between 1940 and 1960, from 11,155 to 2,453 jobs nationwide. The ranks of blacksmiths fell 59 percent, from 5,024 to 2,039 jobs. On the other hand, electrician jobs doubled, from 7,094 to 14,158.

LIFEBOAT, NOT SAVIOR

Dieselization is often credited with "saving" the railroads, which had gone into a long economic decline early in the 20th century. World War II was a bright moment, but it also wore out most of the steam locomotive fleet. After the conflict, even with dieselization, the railroads remained stressed by inflation, increasing highway and airline competition, and punishing restrictions on setting rates and even entering new markets. Instead of saving the railroads, dieselization served more as a "lifeboat" to keep the industry afloat until deregulation in 1980.

However, it is clear the railroad industry would never have survived if it had not converted from steam to diesel, for several reasons. Railroads could not have overcome the inefficiencies and costs of continuing to use steam. Coupled with low economic returns on investment, inadequate rates kept artificially low by regulations, and normal economic pressures like inflation, steam-powered railroads would have become the buggy whip of freight transportation. Also, steam was simply too inefficient, especially in conversion of the energy content of fuels into useful work, and a coal-fueled system is especially beyond comprehension from an environmental perspective.

After dieselization of the Class I railroads was essentially completed in 1960 (on May 7, when the Norfolk & Western parked its last operating steam locomotive, 0-8-0 No. 291, in Williamson, W.Va.), the diesel builders met the railroads' need for motive power. EMD maintained its position at the top of the market, and Alco settled into a weak second place. But on April 26, 1960, General Electric announced it was entering the domestic locomotive market as an integrated builder (controlling most if not all of the components and systems needed to assemble a diesel-electric locomotive). This was the entrance onto railroading's stage of the 2,500 h.p. U25B. That date was significant for two reasons.

First, the U25B gave GE its own branded road locomotive (previously GE had been a major electrical supplier to other builders, and a partner with Alco from 1940 to 1953). The U25B introduced several unique improvements such as simplification and improvement of providing "clean air" for ventilating electrical components and air for engine combustion, and it also kick-started the first "horsepower race," challenging both EMD and Alco beyond the nominal 2,000 h.p., B-B ceiling.

Second, the U25B positioned GE for what happened two decades later: It was the launch pad for the company's eventual ascendance to the position of top locomotive builder.

Carl Schlemmer was the general manager of GE Transportation Systems in Erie, and in 1979 he embarked on an audacious plan to give GE a locomotive design that could compete with EMD's best (something it had never been able to do), and to also make the Erie business profitable (which it had never been). Schlemmer requested $316 million from corporate GE to upgrade and modernize Erie's decades-old locomotive plant and to develop a new locomotive to succeed the "Dash 7" (which itself had succeeded the U-series line of the 1960s and '70s). Schlemmer needed the money to modernize and reduce manufacturing costs, and to engineer the new "Dash 8" locomotive which would be assembled in modules (a first for diesel locomotive production).

Dieselization did not "save" the railroads. It was more of a "lifeboat" that kept them afloat until deregulation.

Schlemmer predicted to GE management that the domestic locomotive market would double during the 1980s. His forecast was wrong. By 1981 the economy had gone into a deep recession; railroads had stored more than 4,000 existing locomotives (equal to two years of combined sales for EMD and GE). The next year, GE locomotive sales dropped by 50 percent, even while Schlemmer was spending cash and finalizing the Dash 8 design. Erie's losses grew, and by 1983 Schlemmer was forced to reorganize the division, slashing costs and jobs. In a situation where other business heads at GE might have lost their jobs, Schlemmer rode out the storm created by his bad forecast, and his candor in explaining what went wrong and how he intended to fix it earned him the continuing support of GE's legendary chairman, Jack Welch.

The Dash 8 prototype was finalized in 1983, and first sales came in 1987, competing head-on with EMD's 60-series locomotives. After 1987, GE outsold EMD in every year except 1989. By the mid-1980s EMD parent General Motors was going through upheaval in the automotive market, and the auto giant appeared to lose interest in EMD, eventually selling it to private investors in 2005. (EMD is now simply a "brand mark" of Progress Rail Locomotives, which is itself owned by Caterpillar; GE Transportation was sold to Wabtec in 2018.)

Most Class I railroads today are going through the "Precision Scheduled Railroading" wave of expense reductions and operational simplification, driving down their operating expenses. This resulted in very few new locomotive sales for the successors to EMD and GE in 2019. In fact, in fall 2019, Union Pacific reported storing more than 2,000 of its 8,000-plus locomotives because of operational improvements. And there are technical challengers to diesel engines, such as storage batteries. Although they may never replace diesel engines as locomotive power plants, they have a good chance of supplementing diesel propulsion.

The next several years will be challenging times for railroads and their locomotive suppliers.

History usually repeats, sometimes clearly and other times masked by the fog of time. In some ways, the railroad and locomotive industries are now repeating much of what history recorded in the 20th century.

Technology will always be changing, evolving, "churning." Users (the railroads) and suppliers (the locomotive builders) must always keep a sharp eye for potential risks and challenges to their status quo.

With major railroads now storing thousands of their diesels, new locomotive sales have dropped to a level not seen in decades. The builders now have an oversupply of manufacturing capacity, similar to that among steam manufacturers early in the 20th century. How will the manufacturers handle, and survive, this downturn in sales?

Quoting the New York Yankees' ever-quotable Yogi Berra: "It's tough to make predictions, especially about the future." Baldwin and GE's Carl Schlemmer learned that.

And to cite another Yogi-ism: "If you don't know where you're going, you might end up someplace else." Like Baldwin did. ■

MIKE IDEN has been involved in railroad operations planning and research; track maintenance planning; and locomotive manufacturing, operations, and maintenance over his 45-year (and counting) rail-industry career.

The B36-8 prototype of 1983, packed with new features, set the stage for GE to displace EMD as the top locomotive builder. GE

Disappearing

BY DON L. HOFSOMMER

Railroad technology originated in England, but it quickly found full embrace in a youthful United States, where enthusiastic advocates promised that rails would alleviate the tyranny of distance by providing all-season, low-cost, high-speed delivery of freight and passengers. By 1850 more than 9,000 miles of track reached west and southwest from the Atlantic port cities. That was only the beginning. During the 1850s alone, 21,605 miles of new railroad routes were placed in service in America.

For communities without rail service, nothing was so devoutly to be wanted, and once a town received a rail line, it soon lobbied for a second carrier to compete with the first.

During the early years, the country's great railroad companies constructed their primary arteries either to link established cities or enable them to claim substantial undeveloped areas which they could develop and market. A fleshing-out process followed with the opening of secondary lines and branches. These were built to open up farmland, access stands of timber, serve mines and quarries, outflank pretenders, make territorial claims, or achieve some combination of these aims.

Railroad construction reached a frenzy during the 1880s. In 1882 alone, 11,568 miles were built, and in 1887, another 12,983 miles were added. For the '80s decade, a staggering 76,733 new route-miles of track were put in service, and as 1890 dawned, the U.S. rail mileage was 163,597.

Despite the Panic of 1893 — which re-

FROM A PEAK OF 254,000 MILES IN 1916, RAIL ROUTES FELL BY MORE THAN HALF

railroad blues

sulted in a five-year financial depression of monstrous proportions — another 31,929 miles were added during the 1890s.

The *Des Moines Leader* in January 1896 boasted that the Hawkeye State's capital had become "pre-eminently the railroad center of Iowa," with lines radiating from the city "like spokes of a wheel." For that matter, said the *Leader*, "the state of Iowa . . . gridironed as it is with railroads" meant that there was "but one point in the state that is 14 miles from a railroad line."

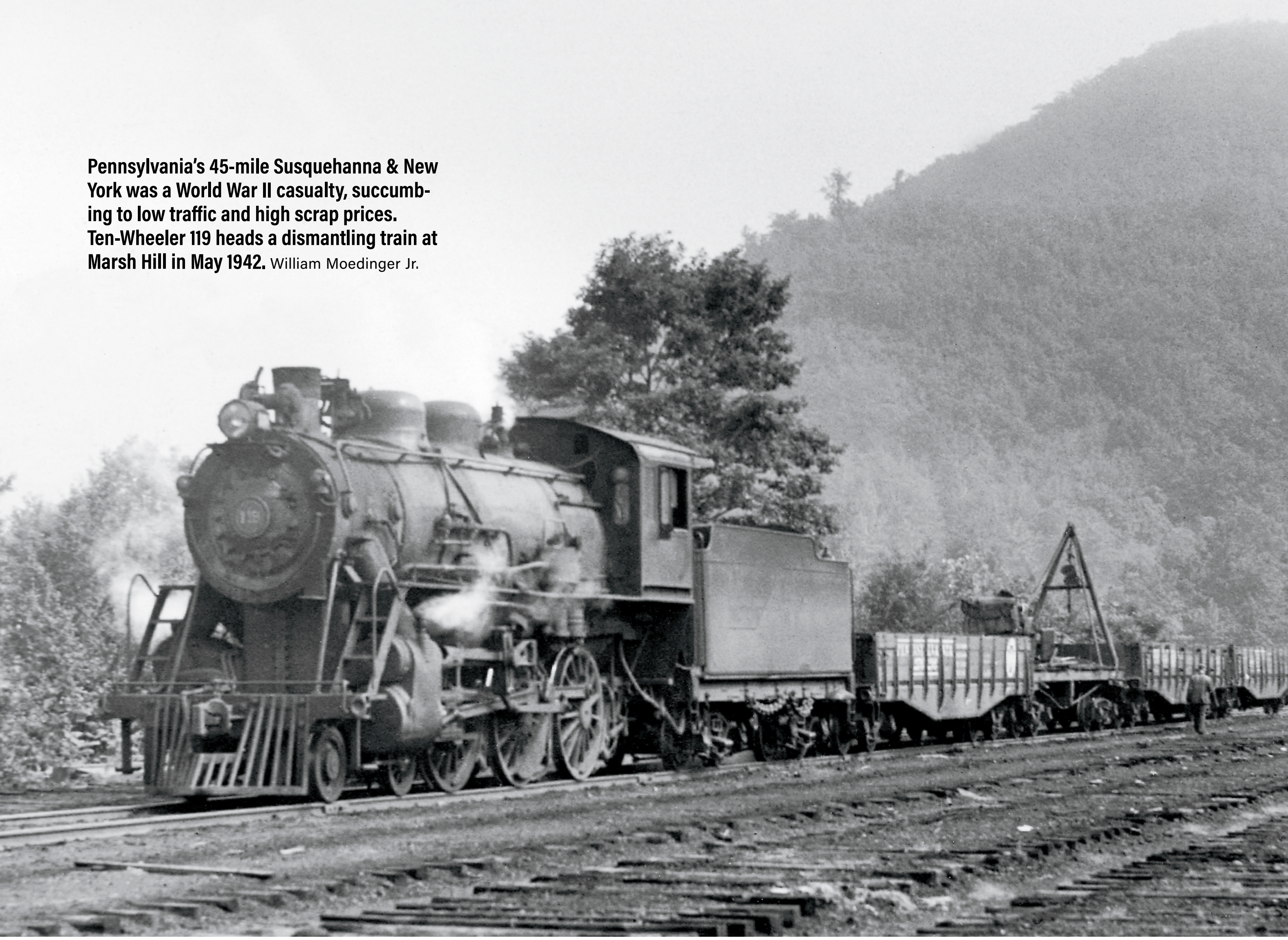
Interurban fever early in the 20th century added almost 16,000 additional miles, most of it under electric wire, to the national network — much of it in Ohio, Indiana, Illinois, Iowa, and Texas.

Short lines added to the mix, including the 52-mile San Luis Valley Southern in Colorado; the 44-mile Ashley, Drew & Northern in Arkansas; and the 140-mile Nevada Northern in the Silver State.

U.S. rail mileage peaked in 1916 at 254,000, but even in the following decade, major roads added strategic reach. The Rock Island, the Frisco, and the Fort Worth & Denver City all expanded in West Texas in the late 1920s, and Southern Pacific completed its Modoc Line in Oregon and California. Early in the 1930s, the Great Northern opened its Inside Gateway route into northern California.

Said historian John F. Stover: "When the iron rail network was built to comple-

Missouri Pacific's line between Benton and Hot Springs, Ark., lies abandoned beneath brand-new Interstate 30 in 1964. Clifton E. Hull



Pennsylvania's 45-mile Susquehanna & New York was a World War II casualty, succumbing to low traffic and high scrap prices. Ten-Wheeler 119 heads a dismantling train at Marsh Hill in May 1942. William Moedinger Jr.

tion in the half-century before World War I, the nation needed nearly every railroad that was constructed. Every little valley could afford a branch line. In a day when the farm wagon was the main mode of transport, closely spaced lines with depots located every few miles made real sense."

In the day of the farm wagon, perhaps. But that day seemed to pass quickly.

Railroads were a key in transforming the United States into a mighty industrial and agricultural giant. Railroads were the glue binding the nation together, their great urban passenger stations seeming as temples where Americans worshipped sacred values — progress, prosperity, and success.

ASSAULTS FROM ALL SIDES

Yet that centrality came under assault. Completion of the Panama Canal in 1914, and growing public sympathy for government-funded improvements for inland waterways, cut into intercity rail freight business, while bicycles and interurban lines took away many short-haul passengers from the "steam roads." But it was the evolution of the motor vehicle — automobiles, trucks, buses — that provided the great competitive threat to the country's railroads.

The new trend gathered pace as states authorized tax-supported roadways and, more importantly, when the federal government pledged itself to a network of "U.S. highways" in 1916. Intercity travel by auto was negligible before 1920, but railroads earlier had noted the impact of autos on short-haul passenger traffic — examples including giant Southern Pacific as early as 1914, and the smaller Soo Line in 1917.

The domestic production of automobiles rose from 4,192 in 1900 to 1,905,560 in 1920. More ominous, insofar as a challenge to railroad revenue was concerned, was the domestic production of trucks — 841,396 in the new century's first 20 years.

Business physicians prescribed several medications — especially mergers and branchline abandonments.

Line abandonments took place even in those years when railroads enjoyed virtual modal monopoly — mostly when mines played out or when forests were cut over with the resulting loss of business. The automobile wreaked havoc on interurbans; trucks destroyed short lines. Agricultural recession in what became known as the heartland during the 1920s, plus "Dust Bowl" weather coupled with financial dislocation of the Great Depression, all in tandem with aggressive modal competition, predictably resulted in railroad companies seeking to dump unproductive or lightly used lines. Minneapolis & St. Louis, as an example, abandoned 126 miles of bits and pieces in Iowa during the 1930s.

Trimming of the national network was

Main lines vanished too, including the Milwaukee's Pacific Extension, which lasted just 71 years (1909–1980). This is Turkey Creek trestle in Montana in September '82. Thomas B. Norman

slowed but not stopped by vastly increased demand for service during World War II. The 27-mile Sibley, Lake Bistenneau & Southern in Louisiana disappeared in 1942 when on-line sawmills and a cotton gin failed to produce adequate billings. Missouri's 51-mile St. Louis & Hannibal likewise threw in the towel.

After the war the industry spent lavishly on diesels, centralized traffic control, and streamlined passenger trains. Results were depressing. American Airlines in 1954 handled more passengers than any single railroad, and the railroads moved only 54.9 percent of intercity freight. Then came President Eisenhower's Interstate highway system, jet aircraft, and the St. Lawrence Seaway to further drain business away. Passengers fled trains, and traditional freight services — less-than-carload, livestock, and perishables, among others — atrophied. The industry, at least much of it, was ill. In 1957, the New York, Ontario & Western simply expired, nearly all of its 541 miles abandoned.

Business physicians prescribed several medications — especially mergers and branchline abandonments. Corporate mergers, they urged, would attack redundancies. And they were right. For example, Chicago & North Western's absorption of the M&StL in 1960 and the Chicago Great Western in 1968 resulted in the evaporation of huge chunks of those by-then mostly redundant systems.

Outlook for the industry remained dreary in the extreme. Bankruptcies in the Northeast in the 1970s were followed by others in the Midwest — much of the Rock Island and the Milwaukee Road consequently being taken up. The new quasi-governmental Conrail closed gateways, and other big roads did the same. Branches everywhere were in danger. Across southern Iowa and northern Missouri, the new (1970) Burlington Northern culled nearly all its feeders and secondary routes.

RAYS OF HOPE

Passage of the Staggers Act in 1980, long awaited, to permit partial deregulation of the industry offered hope, as did growing revenues from the movement of low-sulfur coal and intermodal traffic, and the industry evolved to a handful of very large carriers and a new generation of short lines. Yet it was a much slimmed-down industry — 122,000 route-miles in 1999, versus 206,000 in 1970.

Line abandonment was fraught with emotion. Leaders in affected communities argued that loss of rail service would have an acutely detrimental impact — their community might, in fact, disappear. That is exactly what happened in Montana, for example, where Melstone, Sumatra, Ingamar, and Vananda turned to dust when the Milwaukee Road abandoned its ill-advised line to the Pacific Coast and some connecting branches. In any event, the absence of rail service certainly did preclude holding or recruiting shippers of a type that required the kind of muscular transportation that railroads offered. Losers? Yes. But a winner, too, in a smaller but still vibrant domestic railroad industry. ∎

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Cheaper by the thousands

A 1959 ICC DECISION LED TO MORE TRAFFIC, MOVED AT LOWER RATES

BY JERRY A. PINKEPANK

Single-commodity trains have operated regularly since railroads' earliest days. In those operations, the equipment probably turned quickly because hauls were short, cars were few in number, and receivers didn't need differentiation in what they purchased. If you received anthracite coal in New York City, you worked with a dealer representing one or a few mines producing similar grades of fuel. If you made pig iron, you similarly dealt with one nearby group of mines, as St. Louis iron makers did when they got ore from southeastern Missouri.

Commercial life became more complex as electric power generating stations and steam locomotives were designed around a particular BTU and ash content in coal, and steel-mill furnaces were tailored to particular blends of iron ore.

So, while a Norfolk & Western 2-8-8-2 might bring 100 cars of bituminous from West Virginia mines into transloading yards at Norfolk, Va., the cars would be marshalled there by mine origin and grade of coal. They would accumulate for weeks before coal was blended to customer order during loading onto a particular ship. A similar accumulation of cars would occur at points like Portsmouth, Ohio, on the N&W or Huntington, W.Va., on Chesapeake & Ohio, to be sent out one or a few cars at a time, in trains mixing coal hoppers with other types of cars carrying all kinds of freight. These single or few hopper cars were delivered to coal dealers and power stations, none of which was set up to receive many cars at once.

AN ICC RULING BRINGS CHANGE

In the late 1950s and early '60s, things began to change. Big power stations that

could receive and unload a whole train at once began to be built. The Interstate Commerce Commission, which had historically not allowed contract rates, considering them to be "exclusive dealing," by nature discriminatory, began approving rates on minimum annual volumes and with specific conditions, which allowed railroads and utilities to accomplish the same thing. Opening the way was a 1959 decision that allowed railroads to establish rates from certain origins in Kentucky, West Virginia, and Virginia to certain power stations of Virginia Electric Power, based on a minimum annual volume of 1.5 million tons. The rates were intended to head off construction by VEPCO of a mine-mouth power plant, and the ICC held that no other entity was disadvantaged, so that no unjust discrimination or undue prejudice against other shippers or receivers of coal would result.

It was immediately obvious that, on this reasoning, anyone with sufficient volume could have such a rate, and that the saving to the railroad from the unit-train operations that resulted would provide the incentive for carriers to offer this saving. Thus, starting in 1962, many similar arrangements followed, with published tariffs that included the efficiency conditions needed to make the lower rates practical, rapid turn times at the origin and destination being the most prominent requirement. A 1964 example was a Pennsylvania Railroad tariff covering coal moved across Pennsylvania from a mine near Tunnelton to a Pennsylvania Power & Light (PP&L) plant at Martin's Creek. Specified was a minimum tender of 5,950 net tons in one train which was to be loaded within 4 hours of spotting at the mine and unloaded within 11 hours of spotting at the destination, using PP&L-owned cars and railroad motive power. Trains under this tariff made two 790-mile round trips a week, and the result was a 600 percent jump in the speed of equipment turns compared with single-car movements. The rate was 27.5 percent lower than the single-car rate.

A notable pre-1964 move was one for Cleveland Electric Illuminating Co. from mines in southeastern Ohio, in which New York Central, Nickel Plate, PRR, and Baltimore & Ohio all participated, which resulted in the closure of a coal-slurry pipeline that had been delivering at $2.47 to $2.67 per ton. Using unit trains, the railroads delivered at $1.88 per ton.

Probably the first use of swivel-coupler cars in unit trains, which allowed unloading in a rotary dumper without uncoupling the cars, was announced in 1963 by NYC and Chicago's Commonwealth Edison. The move was from a mine near Evansville, Ind., to Hammond, with round trips to be made in 48 hours using ComEd cars.

Another innovation was the use of aluminum cars with their increased payload for a given axle load. Burlington Route in 1966 began using railroad-owned cars with aluminum bodies and 105 tons capacity from a mine near Benton, Ill., to a Union Electric plant at Machens, Mo.

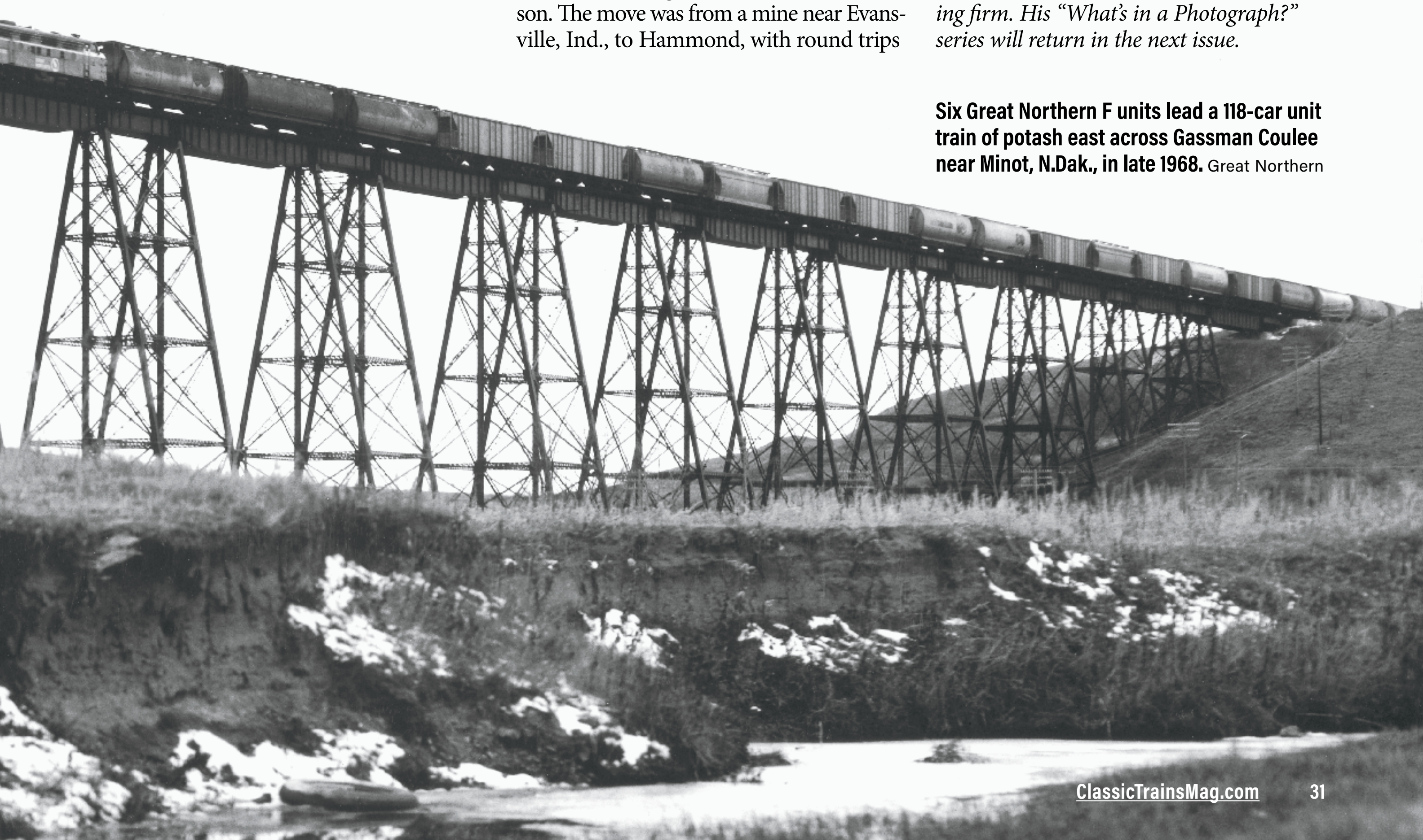
NOT JUST COAL TRAFFIC

The concept of using unit trains to increase equipment utilization soon spread to grain movements. In 1967 Cargill and Illinois Central began running 115-car trains of 100-ton-capacity Cargill covered hoppers from a facility at Gibson City, Ill., to Cargill's export facility at Baton Rouge, La. To achieve a rate reduction of 50 percent compared with single-car moves, Cargill committed to 56 round trips a year.

The unit-train concept has since spread to shipments of potash, ethanol, and crude oil, a huge step forward in keeping railroads competitive. ■

One new unit-train operation resulted in a 600 percent reduction in cycle time and a 27.5 percent reduction in rates.

JERRY A. PINKEPANK was an officer with NYC, CB&Q/BN, and Soo Line; since 1989 he's run his international rail consulting firm. His "What's in a Photograph?" series will return in the next issue.



Six Great Northern F units lead a 118-car unit train of potash east across Gassman Coulee near Minot, N.Dak., in late 1968. Great Northern

TEMPLES of TRAIN TRAVEL

GREAT STATIONS ROSE AS THE RAIL INDUSTRY NEARED ITS PEAK

BY ROBERT S. McGONIGAL

Railroad manager John A. Droege observed in his 1916 book *Passenger Terminals and Trains* that the average major station "retained its adequacy" for only about 25 or 30 years. Since the dawn of railroading, train travel had been trending ever upward, repeatedly overwhelming the facilities that were built to handle it. Even if a terminal might physically be able to accommodate the throngs, the public was demanding more amenities. A ramshackle station in an increasingly prosperous city, served by multiple, competing carriers, would not do, and railroads built bigger, grander terminals, or vastly expanded existing ones, as the 19th century turned to the 20th.

The trend did not continue. Droege's book came out in the very year that U.S. rail mileage hit its peak. Passenger traffic was peaking too, as automobiles, and good roads on which to drive them, proliferated. Droege did not foresee the end of rail's dominance, but he did note that on many carriers, passenger service, even in that era of booming traffic, was only marginally (if at all) profitable, and that terminals were costly to build and maintain. Yet he and his peers believed such expenditures were necessary to accommodate the traffic and to meet public expectations. Thus, many of railroading's greatest monuments were expressions of the carriers' commitment to public service, foreshadowing their slowness to exit the passenger business in future decades.

Grand Central Terminal's concourse, grimy and cluttered with kiosks and billboards in 1985, has since been restored to its 1913 brilliance. MTA Metro-North Railroad

The terminals built in the early 20th century would prove to be more than adequate for future traffic, their capacities taxed only during wartime. With a few notable exceptions, the stations in use in the early 1920s would serve for the remainder of the century, often outlasting the rail service that prompted their construction in the first place. Railroads might modernize their stations to keep up with public taste, applying the latest styles to decades-old structures, but wholly new terminals were no longer required. Most of the handful of big stations built after 1930 were long-planned projects that consolidated several smaller, older facilities under one roof.

Several major stations fondly remembered from the heyday of 20th century rail travel were products of the 19th. The oldest was B&O's Camden Station in Baltimore, built in 1857 and expanded 10 years later (and supplemented by Mount Royal Station in 1895). Indianapolis, whose 1853 union station was America's first, got a new one in 1888. Chicago's Dearborn, Grand Central, and Central stations dated from the 1880s and '90s. In Philadelphia, PRR's Broad Street underwent its second and final expansion in 1893 as the Reading was completing its great terminal nearby. Other 1890s landmarks included union stations in St. Louis and Portland, Ore., plus Boston's South Station.

Stations of the 19th century exhibited a

New York's Penn Station, shown just before its 1910 opening, was a breathtaking blend of steel, glass, and stone. Classic Trains coll.

range of revival styles, including varieties of Italianate, Gothic, and especially Romanesque. By the 20th, a preference for classically styled public buildings had emerged. This aesthetic, characterized by monumentality, columns, arches, and symmetry, was a natural for large terminals. Albany (N.Y.) Union Station of 1900 was an early example, followed in 1907 by one of the most notable terminals of any style, Washington Union Station.

Construction continued unabated into the new century. Besides Albany, 1900 saw the opening of union stations in Nashville and Dayton. Other stations followed over the next 10 years, at Richmond, Va. (Main Street); Savannah, Augusta, and Atlanta, Ga.; Chicago (La Salle Street); Pittsburgh (PRR); Seattle (King Street); Chattanooga (Southern Railway); Hoboken, N.J. (Lackawanna); and Birmingham, Ala. (Terminal Station).

The century's second decade would be the last great one for station construction, and it began with a bang in 1910, when PRR opened Pennsylvania Station in New York City. The next year saw openings in Baltimore (PRR); Chicago (C&NW); Seattle (Union Station); and Houston. Two New York Central System landmarks opened in 1913: the incomparable Grand Central Terminal in New York and Michigan Central Terminal in Detroit. As war broke out in Europe, 1914 witnessed new or rebuilt stations in San Francisco, Jersey City (CNJ), Denver, Kansas City, and Minneapolis (GN). Santa Fe opened its lovely San Diego station in 1915; Dallas Union Terminal came into use in '16. The decade ended with two landmarks in the South: Broad Street Station in Richmond, Va., and Jacksonville (Fla.) Terminal.

Jacksonville Terminal, rail gateway to Florida, got a new, classically styled head building in 1919. Other improvements gave it a total of 11 through and 15 stub tracks. Jacksonville Terminal Co.

The 1920s saw completion of two projects begun before World War I: St. Paul Union Depot (1920) and Chicago Union Station (1925). Smaller stations went up at Ogden, Utah; Sacramento, Calif. (SP); and Lincoln, Nebr. (CB&Q). In Canada, Toronto Union Station opened in 1927. A new Boston North Station replaced older facilities in 1928. NYC's colossal Buffalo Central Terminal opened four months before the start of the Great Depression.

Momentum carried a few projects to completion in the 1930s, including Cleveland Union Terminal ('30), Omaha Union Station ('31), and Cincinnati Union Terminal ('33). PRR's 30th Street of 1933 was the culmination of the road's Philadelphia Improvements, and set the stage for Broad Street's 1952 closure. Finally in 1939 came Los Angeles Union Passenger Terminal.

And that was about it. Montreal's Central Station opened in 1943. After decades of trying, Toledo got its Central Union Terminal in 1950. Four years later, New Orleans Union Passenger Terminal, which replaced five stations, became the last truly major big city terminal to open. Milwaukee's MILW and C&NW stations, in the path of expressways, were replaced by a single MILW-owned depot in 1965.

Amtrak, seeking modern facilities more suited to greatly reduced traffic levels, built small, utilitarian stations in several cities, starting with Cincinnati in 1972. Meanwhile, many of the great terminals — those that hadn't been demolished — came to be regarded as civic treasures and were repurposed for a spectrum of non-rail uses. In a few, like Cincinnati and Kansas City, small areas were found for Amtrak waiting rooms. ■

Opened in 1925, Union Station was the biggest and last-built of Chicago's six mainline terminals. The concourse, seen here, was razed in 1969; the waiting room survives. Linn H. Westcott

The last truly magnificent station to open was 1939's Los Angeles Union Passenger Terminal. An architectural blend of Spanish Colonial and Art Deco styles, it entered the 21st century busier than it had ever been. David Lustig

Supersize

Freight car size has always been a key to efficiency for railroads. Following an increase in car size as steel construction emerged early in the 20th century, car capacity remained largely consistent into the 1950s. That era, however, saw a dramatic increase in both car size and specialization.

Although steel components were making inroads by 1900 — especially for hoppers, gondolas, and tank cars — all-wood car construction was still the norm for "house" (box, stock, and refrigerator) cars. Most cars were relatively small (28- to 32-foot boxcars were common), with 20- to 30-ton capacities. Steel hoppers were commonly 40 to 50 tons, with some larger cars. By 1908, Class I railroads owned 1.7 million freight cars, with an average capacity of 29.4 tons.

World War I saw the first standardized cars, with the U.S. Railroad Administration (which operated the railroads from 1917 to 1920) allocating 100,000 cars of various types to carriers across the country. These were all-steel or steel-underframe cars with capacities of 40 and 50 tons, with 70-ton capacity for some hoppers and gondolas. Thousands of additional cars were built through the 1920s based on these USRA designs.

Later, standard car designs were issued by the American Railway Association (ARA), then by the Association of American Railroads (AAR) after 1934. Adhered to by many builders, these featured updated designs and all-steel construction. Weight limits would remain largely unchanged for the next three decades.

Through the 1940s, the ubiquitous 40-foot, 50-ton boxcar was the standard freight car. In 1946, of the 2 million cars in service on U.S. railroads, 730,000 were boxcars, almost all of which were general-purpose cars. Railroads loved general-service boxcars — they were inexpensive and could haul anything from crated, boxed, and sacked goods to lumber to bulk grain.

The only other car type as prevalent was the combined classification of gondola and hopper cars, which totaled 881,000 cars in 1946, most of which were in dedicated coal service or serving steel mills. Smaller numbers of tank, stock, flat, and refrigerator cars made up the rest of the fleet; most had a capacity of 40 or 50 tons.

Less than 20 years later, general-purpose 50-ton boxcars were on the decline. Not only were freight cars becoming larger, but general-purpose cars were beginning to give way to specialized cars designed for single commodities or dedicated service. Manifest freight trains, typically solid strings of boxcars through the steam era, by the '60s featured a mix of many car types and sizes.

loads

LARGE, SPECIALIZED FREIGHT CARS HELPED THE INDUSTRY WIN TRAFFIC AND CARRY RECORD TONNAGES

BY JEFF WILSON

This 32-foot, 30-ton capacity ice-bunker refrigerator car, built around 1900, features all-wood construction with a truss-rod underframe. Classic Trains collection

INCREASED WEIGHT LIMITS

Car weight and capacity are functions of gross rail load (GRL). The GRL is the maximum allowable weight on rails for a car. Look at a car's capacity data: Adding the light weight (the car's weight when empty — the tare weight) and the load limit (the actual allowable weight for the load itself) equals the GRL.

Through the 1950s cars with a nominal 50-ton capacity (a GRL of 169,000 pounds) were the standard for unrestricted interchange. By the late 1950s most routes allowed 70-ton capacity cars (GRL of 210,000 pounds), and many main routes could handle 100-ton cars (GRL of 251,000 pounds). Railroads were lobbying for larger, heavier cars.

In 1963 the AAR bumped up the GRL for each weight class: to 177,000 pounds for 50-ton cars, 220,000 pounds for 70-ton cars, and 263,000 pounds for 100-ton cars. This marked the effective debut of

Excess-height "high-cube" auto-parts cars first appeared in 1964. Their capacity of about 10,000 cubic feet was some 2½ times that of 40-foot cars like the one at left. Thrall built this car for Union Pacific in 1964. John S. Ingles

Large tank cars became common in the 1960s, especially for light-density products such as liquefied petroleum gas. General American built this 100-ton, 30,200-gallon car in 1962. Multi-diameter tanks like this one were built through the late 1960s. John S. Ingles

Pullman-Standard's 4,750-cubic-foot PS-2 covered hopper was the most popular grain car of the 100-ton era, with more than 56,000 built from 1966 to 1972. This car, part of Union Tank Car's lease fleet, was built in 1980. Scott E. Russell, Brian Schmidt collection

the 100-ton car as standard, as they were then allowed for interchange.

Railroads were quick to take advantage. Larger cars allowed carrying more freight in fewer cars, which also lowered fuel and maintenance costs. As an example: the 40-foot, 50-ton boxcar — then the standard type for hauling grain — carried just over 1,700 bushels of corn. A 100-ton, 4,600-cubic-foot covered hopper held about 3,700 bushels, double the boxcar load, cutting in half the number of cars needed to carry the lading.

Loading fewer cars to carry the same amount of grain means fewer cars need to be switched and handled, and that trains would carry less dead (tare) weight. An empty 40-foot boxcar weighs about 23 tons, a 100-ton hopper about 31 tons. Thus a grain train of 75 jumbo covered hoppers resulted in 2,325 tons of tare weight, while a train of 150 40-foot boxcars needed to carry the same load has 3,450 tons of dead weight.

Fewer cars also meant fewer trucks and wheels — less rolling resistance, with fewer chances of mechanical issues such as overheated bearings and cracked wheels — along with fewer couplings, meaning less slack action, smoother operation, and, because of fewer hose connections, less air-brake line leakage.

SPECIALIZED LARGER CARS

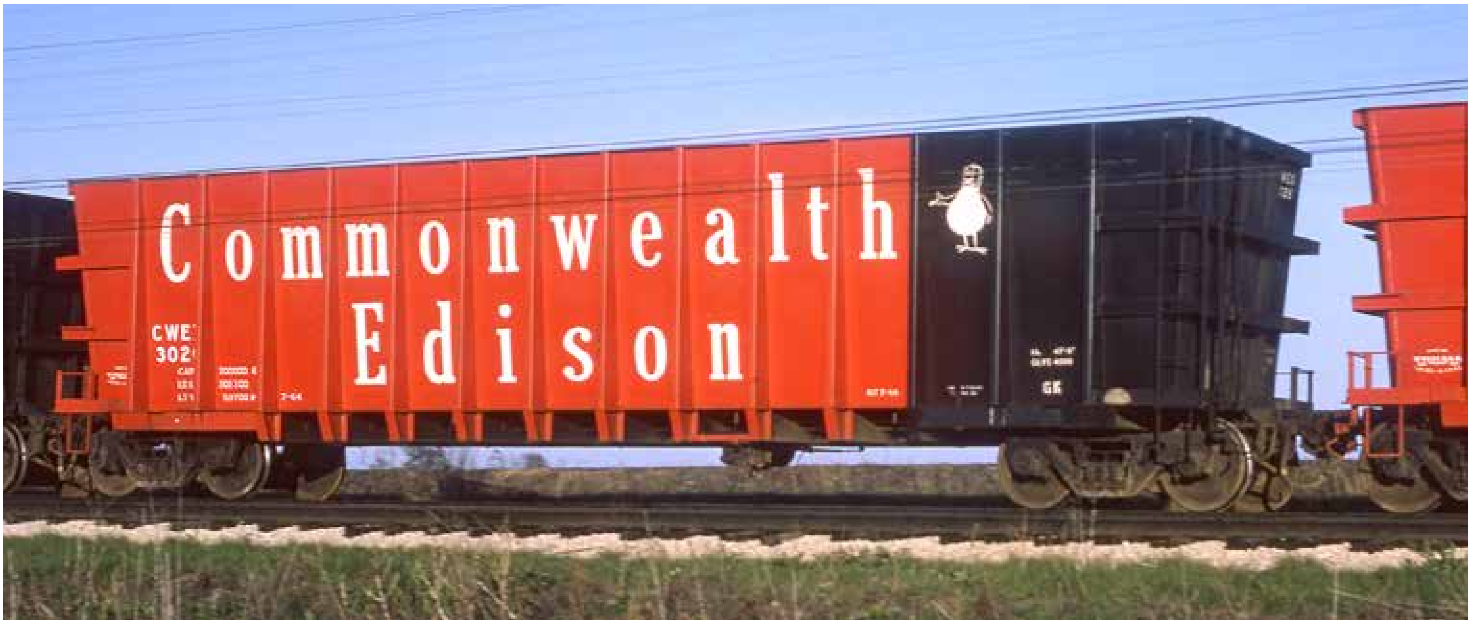
The larger weight limits, together with new rate structures and the emergence of piggyback traffic, spurred a movement to specialized cars. Railroads began working to retain time-sensitive traffic that had been shifting to trucks, such as automobiles and auto parts.

Among the first long cars were piggyback and auto-rack flatcars: 75-foot piggyback cars in 1955, 85-footers by 1958, and 89-foot cars in 1961. Bi- and tri-level auto racks began appearing on these cars in 1960, first on 85-foot flatcars and then on 89-footers. These saved the new automobile business for railroads.

Large specialty boxcars began appearing, led by the 86-foot, excess-height auto parts cars introduced in 1963. They were designed at the request of, and with cooperation from, auto manufacturers. Other larger boxcars included 50- and 60-foot auto parts cars as well as plug-door insulated boxcars and cars with internal load restraints. These were assigned to beverage, food, or appliance service.

Most 50-ton tank cars in the mid-1950s had a capacity of 8,000 to 12,000 gallons. Increased weight limits saw tank cars grow to 20,000 gallons and larger by the early 1960s, with 100-ton cars for low-density products like anhydrous ammonia and LPG at 30,000 gallons and larger. Some 50,000-gallon cars were built in the mid-1960s before tank size was capped at 34,500 gallons.

Southern Railway's 100-ton, 4,713-cubic-foot "Big John" covered hoppers, built by Magor in 1960, paved the way for 100-ton covered hoppers from several builders. These — together with newly approved rates — led to covered hoppers taking over grain traffic from boxcars by



ComEd's Thrall-built 100-ton, 4,000-cubic-foot coal gondolas, built in July 1964, were the first unit-train cars equipped with rotary couplers (on the black end). This enabled them to be unloaded without uncoupling. Thrall built versions of this car through the 1970s. J. David Ingles

the mid-1970s. Grain and other agriculture products, along with cement, sand, and plastic pellets, have made covered hoppers the most common car type today.

Another early-1960s development was the 100-ton coal gondola, which — thanks to large power generating plants, rotary dumpers, and the growth of the coal unit train — soon became the most common type of coal car. Other new, specialized cars included coil-steel flatcars, jumbo wood-chip gondolas, mechanical refrigerator cars, and center-beam lumber cars.

CARLOADS DOWN; VOLUME UP

Larger cars meant fewer cars were loaded, but each carried more freight — and trains were carrying it farther. In 1940 there were 36.3 million carloadings, with a total of 1.84 billion tons of freight carried. An average loaded car carried 26.7 tons of freight, with an average haul of 185 miles.

In 1960, carloadings had dropped to 30.4 million — but even in a down economic year, total freight carried was up to 2.29 billion tons. An average car carried 34 tons of freight 250 miles (572.3 billion ton-miles). This trend continued to the modern era; by the 2010s average freight car capacity was more than 100 tons, with 30 million carloadings and 1.7 trillion ton-miles.

Dramatic growth in car size and specialization was a critical factor that helped shaped railroading. ■

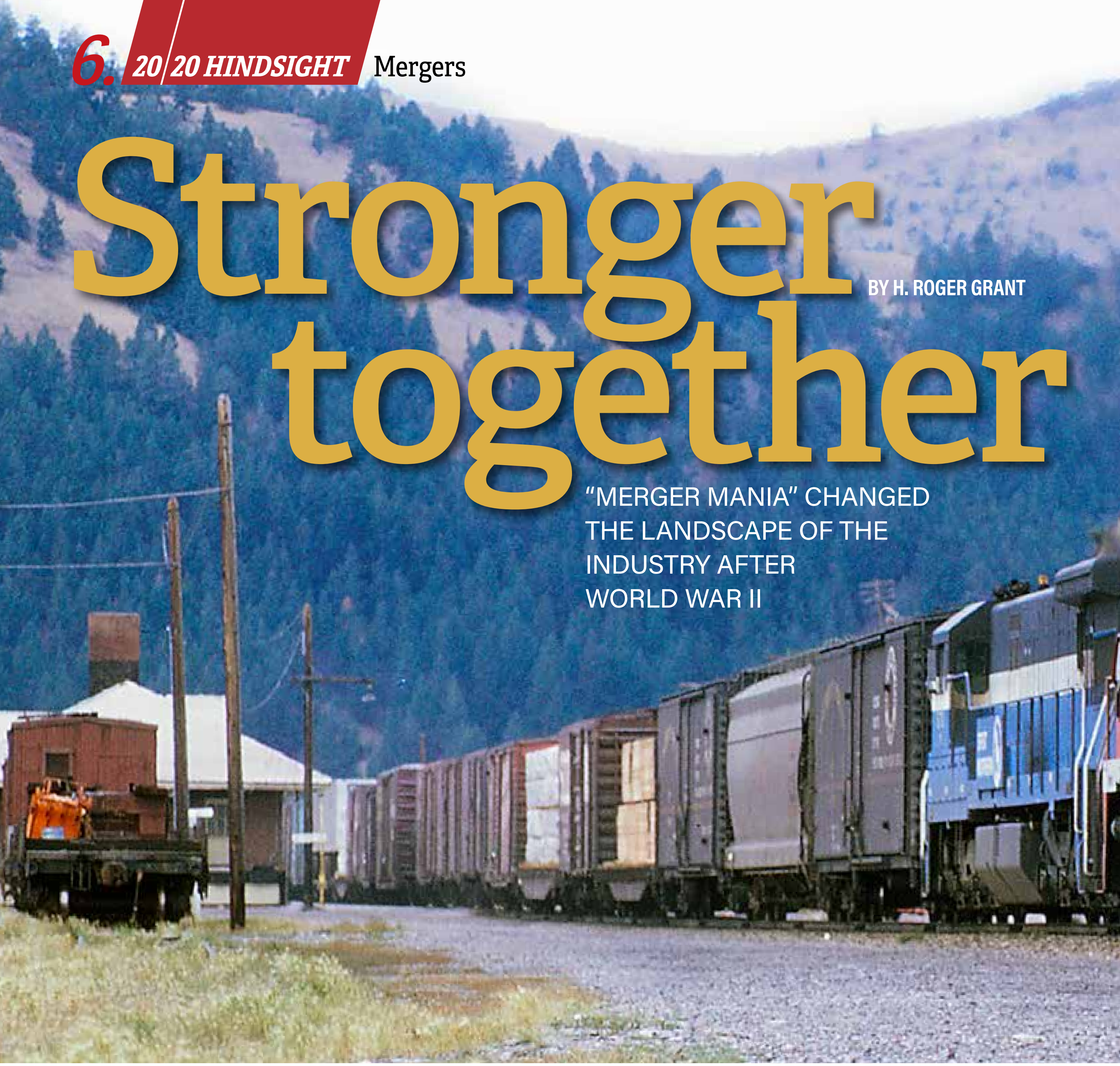
JEFF WILSON, an editor in Kalmbach Media's Books Department, is the author of more than 30 books, including Modern Freight Cars *and* Freight Cars of the '40s and '50s.

Fifteen new Ford Mustangs ride a tri-level, 89-foot auto-rack at Chapin, Ill., in May 1964. The efficiency of racks recaptured the new-car business for railroads. J. David Ingles

Stronger together

BY H. ROGER GRANT

"MERGER MANIA" CHANGED THE LANDSCAPE OF THE INDUSTRY AFTER WORLD WAR II



If one were to examine the national railroad map at the dawn of the 20th century and compare it with one a century later, the changes would be stunning. A sizable reduction in route mileage has occurred and so has the number of major carriers. Yet the disappearance of corporate entities is not a new phenomenon, dating back to the 19th century. During the decades following the Civil War the process of "system building" accelerated. By 1900 every important railroad possessed a substantial, even complicated corporate genealogy. None of the largest systems had been shaped by a single corporation, individuals working in a common interest, or according to a single plan.

Take the Rock Island Lines. The process began in 1866 when the 228-mile Chicago & Rock Island Railroad, the original unit, assumed ownership of the financially distressed and uncompleted 231-mile Mississippi & Missouri Railroad to form the Chicago, Rock Island & Pacific Railway. By 1901 the company controlled more than 3,600 miles, and in the early 1930s its mileage peaked at around 8,000 miles. The Rock Island claimed ownership or control of multiple carriers, including two substantial ones, Burlington, Cedar Rapids & Northern and Choctaw, Oklahoma & Gulf. Furthermore, a few companies sought to extend their own lines, most notably the Chicago, Milwaukee & St. Paul that opened in 1909 its Pacific Coast Extension between South Dakota and Washington State.

GE U33Cs of Northern Pacific and Great Northern heritage bracket a Burlington Route U25C on an eastbound freight at Garrison, Mont., in September 1970, indicative of the roads' merger to form Burlington Northern six months earlier. Doug Wingfield

The advantages of larger regional or inter-regional railroads became obvious. They enjoyed economies of scale and could compete more favorably with their principal rivals. It was this fierce competition between New York and Chicago roads during World War I that helped to trigger "federalization" of most of the nation's railroads and strategic electric interurbans. Although the United States Railroad Administration had its shortcomings, it demonstrated the merits of unification.

Following the conflict, organized labor, which had flourished under government control, pushed hard for nationalization. Yet its Plumb Plan, resembling efforts by earlier Populists and Socialists, went nowhere. The concept of fewer, more efficient carriers, however, found bipartisan Congressional support, and this led to the Transportation Act of 1920 or Esch-Cummins Act. A key feature of this measure required the Interstate Commerce Commission to produce a comprehensive plan for amalgamation of most steam roads. It did not take long before Harvard University professor William Z. Ripley created a list of 21systems. Specifically, he suggested five eastern trunk lines, five western combinations, four southeastern systems, two tidewater coal roads, and two southwest combinations. All would be clustered around one or two major carriers. Ripley also proposed regional combinations in Florida, Michigan, and New England.

The ICC responded. It subsequently modified the groupings, cutting the num-

A Rock Island train approaches Chicago's La Salle Street Station in September 1963. Union Pacific attempted to acquire the road in 1964, but by the time federal regulators ruled on the case, the Rock was run down and UP walked away. Alvin L. Schultze, David P. Oroszi collection

ber of systems to 19. Most of these changes occurred among western roads. A series of industry and shipper objectives followed. Although the pairings were not irrational, the matter had become a hot potato, frustrating the ICC. Yet lawmakers persisted, and the ICC was forced to concoct its "Final Plan." Late in 1929 it appeared. Again, there would be 19 systems and also two additional ones that involved the Canadian National and Canadian Pacific. Unfortunately for backers of what amounted to a railroad cartel, the onslaught of the Great Depression ended serious discussions by Congress and the ICC about implementation.

During the time the ICC sought to bring about an acceptable unification plan, there were railroad combinations. These involved the creative efforts of two Cleveland real-estate developers turned railroad investors, O. P. Van Sweringen and his younger brother M. J. Van Sweringen. The "Vans," who in 1916 had taken control of the Nickel Plate Road from the New York Central, were able in 1923 to win ICC approval to merge the Toledo, St. Louis & Western and Lake Erie & Western into their Nickel Plate. When in 1925 they had been unable to win ICC approval to unite the Chesapeake & Ohio, Erie, Nickel Plate, and Pere Marquette properties into a single entity, they launched their first holding company as a way to sidestep regulators. Still they wanted the ICC's blessings. Undaunted by the earlier Commission decision, the Vans later petitioned to merge the C&O, Erie, and Pere

Symbolic of the Norfolk & Western's 1959 acquisition of the Virginian, EL-C electric No. 235 rests at South Roanoke, Va., on April 15, 1960, in fresh black N&W paint. Dan Dover collection

Postwar merger mania

1947 Gulf, Mobile & Ohio merges Chicago & Alton

Denver & Rio Grande Western merges Denver & Salt Lake

Chesapeake & Ohio merges Pere Marquette

1949 Nickel Plate Road leases Wheeling & Lake Erie

1957 Chicago & North Western leases Chicago, St. Paul, Minneapolis & Omaha

Louisville & Nashville merges Nashville, Chattanooga & St. Louis

1959 Norfolk & Western merges Virginian

1960 Erie and Delaware, Lackawanna & Western form Erie-Lackawanna

Chicago & North Western merges Minneapolis & St. Louis

1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960

The 1968 Penn Central merger combined the Pennsylvania and New York Central. In April 1970, a caboose hop crosses the Great Miami River into Dayton, Ohio, the two lead units still in pre-merger liveries with the trailing F7 and transfer caboose in the new road's image. David P. Oroszi

Marquette, but they were rejected. It was then that they formed a master holding company, the Alleghany Corp., an entity that absorbed all of the brothers' railroad assets. Still, the Vans failed to achieve their goal of actual mergers.

DEPRESSION-ERA EFFORTS

Even though the ICC unification plan was dead on arrival, the 1930s saw more merger talk. It would be the Prince Plan that took the spotlight. Formulated in 1933 by financier Frederick Prince and railroad expert John W. Barriger III, it came in response to the severe financial problems that gripped the industry. The revised version was a seven regional system arrangement, but it did not include properties owned or used by the Canadian National and Canadian Pacific and some switching and terminal roads. The core thinking was to create a more efficient and cost-saving railroad network.

"No system shall penetrate any new area through inclusion of a weak or attenuated line that will be at a traffic and an operating disadvantage," explained Barriger. "It is essential to establish only strong groups which can provide superior service at a profit throughout their entire extent." The plan would be voluntary, but once the seven systems emerged, each would become a new corporation. These units would control their constituent roads through a 15-year lease and make rental payments to their owners. These leases could turn into purchases. There were strong objections, mostly from railroads that felt disadvantaged by the pairings. Although the Prince Plan was stillborn, it sparked creation in 1934 of the Association of American Railroads, designed in part to assist member carriers to co-ordinate their operations.

The Interstate Commerce Commission never again would get involved in any massive consolidation efforts. The Transportation Act of 1940, influenced by the failed "Final Plan," spelled out ICC unification policy. It required the Commission to supervise mergers, approving only those that it considered to be in the public interest. Yet there was little interest to unite during the 1940s and early 1950s. Carriers enjoyed wartime profits, being able to emerge from Depression-era bankruptcies, retire or reduce indebtedness, and pay good stock dividends. The emerging diesel revolution also substantially reduced operating costs, and revenues spiked with postwar consumer demands, especially for housing, autos, and other durables.

Enjoying the benefits of diesels and high traffic, railroads had little interest in combining during the 1940s and early '50s.

During the coming decades the ICC

1961 Duluth, South Shore & Atlantic; Minneapolis, St. Paul & Sault Ste. Marie; and Wisconsin Central form Soo Line

1964 Norfolk & Western merges Nickel Plate Road and Akron, Canton & Youngstown, leases Wabash and Pittsburgh & West Virginia

1967 Atlantic Coast Line and Seaboard Air Line form Seaboard Coast Line

Missouri Pacific merges Chicago & Eastern Illinois

1968 Chicago & North Western merges Chicago Great Western

Pennsylvania and New York Central form Penn Central; New York, New Haven & Hartford added in 1969

1970 Chicago, Burlington & Quincy; Great Northern; Northern Pacific; and Spokane, Portland & Seattle form Burlington Northern

1971 Louisville & Nashville acquires Monon

1972 Illinois Central and Gulf, Mobile & Ohio form Illinois Central Gulf

1973 Baltimore & Ohio, Chesapeake & Ohio, and Western Maryland form Chessie System

1974 Southern buys original Norfolk Southern Ry.

1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974

Conrail container train TV204 makes its way down the River Line on the west side of the Hudson River at Fort Montgomery, N.Y., in October 1993. The railroad went from a collection of bankrupt outcasts to a highly sought property in less than 25 years. Howard Ande

found that mergers would become a messy process and at times highly controversial. Yet as "merger madness" emerged in the latter part of the 1950s, the corporate marriages which occurred were not contentious. Two which blazed the way involved the 4,785-mile Louisville & Nashville absorbing the 1,043-mile Nashville, Chattanooga & St. Louis (in which it had long held a majority interest) and the 2,132-mile Norfolk & Western taking over the 611-mile Virginian. The former was designed for retrenchment and economies. Line abandonments and elimination of duplicate support facilities and personnel would create the anticipated objectives. The process had started in 1955 and the effective date for the merger was August 31, 1957. N&W+VGN was intended to enhance earnings. The merger of these two profitable carriers, which

1976 Penn Central, Reading, Erie Lackawanna, Lehigh Valley, Jersey Central, and Lehigh & Hudson River combined to form Conrail

1980 Burlington Northern merges St. Louis-San Francisco

CSX Corp. formed to facilitate future Chessie and Seaboard merger

1981 Grand Trunk Western merges Detroit & Toledo Shore Line

1982 Union Pacific merges Missouri Pacific and Western Pacific

Norfolk & Western and Southern form new Norfolk Southern Corp.

Louisville & Nashville and Seaboard Coast Line form Seaboard System Railroad

1983 Grand Trunk Western merges Detroit, Toledo & Ironton

1986 Soo Line merges Milwaukee Road

CSX Corp. forms CSX Transportation as components are merged

1988 Union Pacific merges Missouri-Kansas-Texas

D&RGW merges Southern Pacific, but adopts the SP name

1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988

the ICC speedily endorsed, became effective on December 1, 1959, and helped to intensify unification discussions primarily among major railroads in the East.

During the 1960s scores of railroads considered merger; some were planned discussions or failed proposals, but others became reality. The aggressive Chicago & North Western, under the guidance of its board chairman, Ben W. Heineman, wanted to create a massive Midwestern system. It would ideally include C&NW, the Milwaukee Road, Rock Island, and others. While neither the Milwaukee nor the Rock Island entered the North Western orbit, it did add the Minneapolis & St. Louis in 1960 and the Chicago Great Western eight years later. Heineman embraced this concept: "Mergers can kill off unwanted and unneeded competition in over-built regions." Although significant parts of the M&StL remained, C&NW retired much of the Great Western. Still, it wanted to reach to the CGW's Rosemport Industrial Park, located near St. Paul, and to access the Kansas City gateway from its main line at Marshalltown, Iowa. That trackage, however, would be abandoned when, during the Rock Island liquidation in the early 1980s the North Western purchased the well-engineered and shorter Kansas City–Twin Cities "Spine Line."

MONSTER MERGER

Then there was the Penn Central Transportation Co., a headline-grabbing monster union. Although New York Central and Pennsylvania stockholders had approved merger in 1962, ICC approval was slow in coming. "M-Day" for Penn Central occurred on February 1, 1968. (As a condition of the merger, the New Haven, "a hopeless invalid," was added 11 months later.) But this was hardly a marriage made in heaven. From the start the railroad bled money, stemming in part from poor pre-merger planning and a clash of corporate cultures. The inevitable happened; PC entered bankruptcy on June 22, 1970. Failure of Penn Central led to the landmark Railroad Revitalization and Regulatory Reform Act of 1976, called the 4R Act, including a statute that on April 1, 1976, created the quasi-public Consolidated Railroad Corp. (Conrail).

While Penn Central failed to become a 19,000-mile railroad powerhouse, other large mergers succeeded. Formation of Burlington Northern in 1970 out of the "Northern Lines" (Burlington; Great Northern; Northern Pacific; and Spokane, Portland & Seattle) became an early and successful mega-merger. "This was a gateway merger and most welcomed," opined Jervis Langdon, who once headed both the B&O and Rock Island and served as lead trustee for Penn Central.

The merger story involved another spectacular disaster, although different from Penn Central. This regulatory blunder would be an event that altered the course of railroad unifications. In 1962 a financially failing Rock Island sought a merger partner. After much discussions, it planned to join the Union Pacific, which sought access over Rock Island rails to the Chicago and St. Louis gateways. Once UP took control, it planned to sell lines south of Kansas City to the Southern Pacific. That road coveted the Rock Island's Golden State Route from Kansas City to an interchange connection at Tucumcari, N.Mex. This acquisition would provide it with its own direct line between California and the Midwest, being more attractive than relying on its St. Louis-Southwestern (Cotton Belt) subsidiary for Midwest access.

Hearings began in May 1966, but it would be not until 1974 that the case ended, after 150,000 pages of testimony, exhibits, briefs, petitions, and replies. By the time of the final report officially approving the merger, the Union Pacific had withdrawn its offer; the Rock Island in its opinion had become a transportation slum. Rock Island management, nevertheless, had made a determined effort to save the road, but it lacked the financial resources to maintain properly its main arteries, motive power, and rolling stock. The excessive length of time it took to close the case would haunt the ICC and became one of the nails in its eventual coffin.

1990 Canadian Pacific merges Soo Line

1991 Canadian Pacific merges Delaware & Hudson

CSX merges Richmond, Fredericksburg & Potomac

1992 CSX merges Pittsburgh & Lake Erie

1993 Wisconsin Central Ltd. merges Fox Valley & Western

1995 Wisconsin Central Ltd. merges Algoma Central

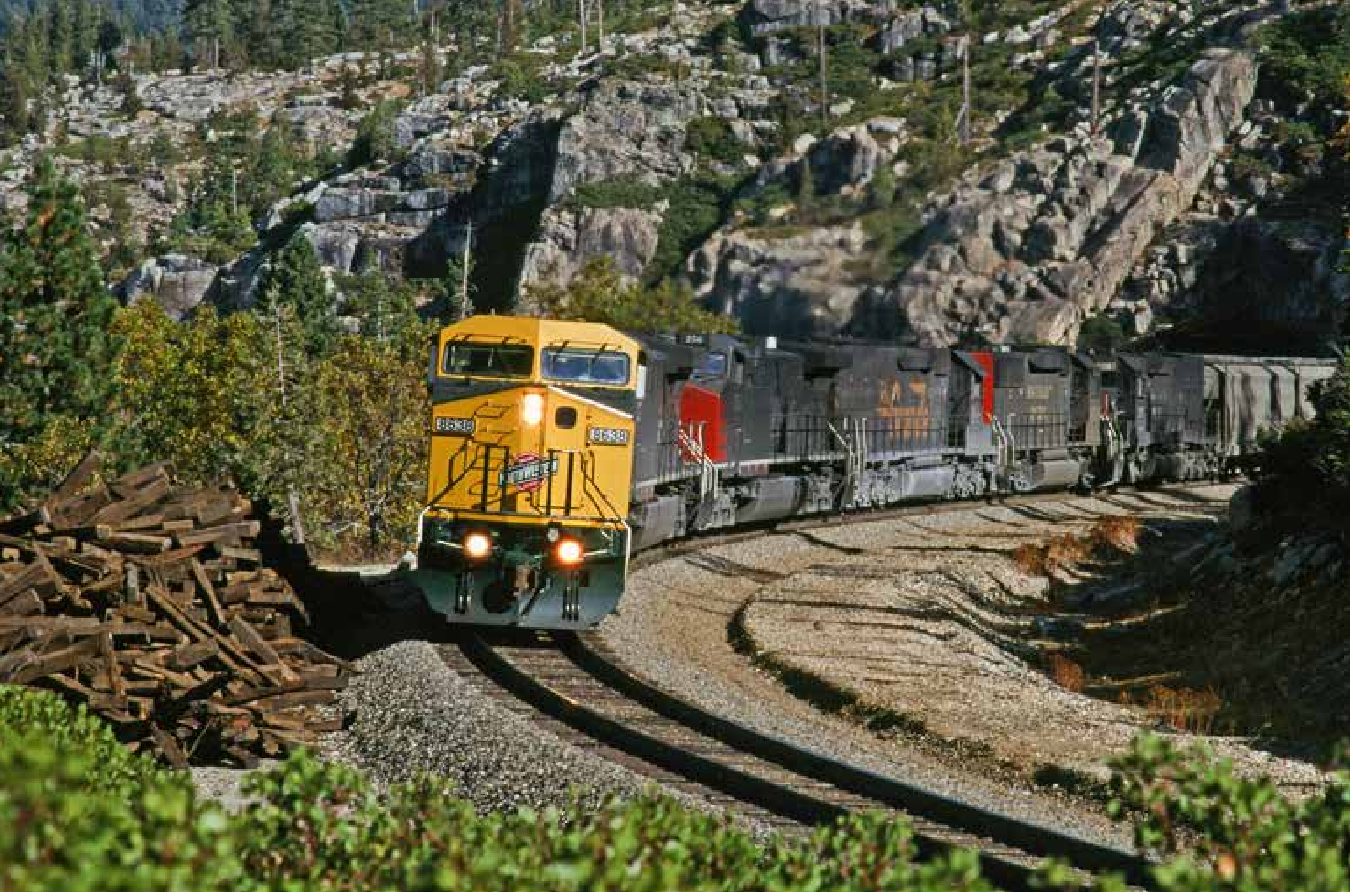
Union Pacific merges Chicago & North Western

Burlington Northern and Santa Fe form Burlington Northern Santa Fe

1996 Union Pacific merges Southern Pacific

1999 Norfolk Southern and CSX divide Conrail

1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999



A westbound Southern Pacific grain train passes Yuba Gap on California's Donner Pass in October 1995. Soon, SP would join Chicago & North Western as part of the Union Pacific system. The trailing Rio Grande unit is symbolic of that road's 1989 merger with SP. Steve Schmollinger

Unquestionably, SPSF stood for "Shouldn't Paint So Fast!"

Fortunately for the railroad industry Congress realized that established procedures employed by the Commission which related to merger cases were badly flawed, the most glaring being that exceptionally long delay with the Rock Island-Union Pacific application. The 4-R Act wisely contained a provision to expedite merger applications. It would be the Burlington Northern-St. Louis San Francisco (Frisco) case, which was filed in December 1977, that became the first major consolidation to be considered under the new law. On April 17, 1980, the ICC gave its unanimous blessing. Although the BN and Frisco had planned to consummate their union in May 1980, the Missouri-Kansas-Texas (Katy) filed a motion for a stay and an injunction preventing merger. But a federal appeals court, which heard arguments in August, allowed the merger to take effect that November.

The 1980s and '90s saw the creation of true railroad giants. In 1980 the Chessie System and SCL Industries merged to form CSX, which stood for "Chessie-Seaboard-Together," and the name for the holding company that was the controlling entity. Two years later the Southern and Norfolk & Western united, creating Norfolk Southern. Also in 1982, Union Pacific, which had scorned the Rock Island, scored a triumph when it acquired the Missouri Pacific and Western Pacific. Later the UP gained ownership of the long-struggling Katy, whose Kansas City–Texas core route was the attraction. And in 1995 Union Pacific bought C&NW, giving UP its long-coveted access to Chicago and also a line to the Twin Cities. Another spectacular union involved BN and Santa Fe, which took effect in September 1995. Creation of mega-railroad Burlington Northern Santa Fe was a seamless union. "On February 7, 1995, shareholders of the both Santa Fe and Burlington Northern approved the merger," remembered Santa Fe and BNSF executive Robert Krebs. "The Interstate Commerce Commission has instituted a quick review process. On August 23 . . . [it] approved our corporate marriage unanimously with only a few, very minor, conditions."

Conrail also became a player. In time this quasi-public corporation, which grew out of the Penn Central debacle, became a vibrant property, thanks in no small measure to regulatory reform. What developed was a bidding war between CSX and Norfolk Southern for ownership. After extensive negotiations, a compromise was reached. Conrail would be split. In 1999 CSX took over what had been much of the former New York Central and NS got large chunks of the former Pennsylvania. The final agreement also led to a shared assets subsidiary that provided terminal operations around Detroit; Newark, N.J.; and Philadelphia.

During the mid-1980s the ICC did flex its regulatory muscle on corporate unifications when the Santa Fe, worried about the development of competing super railroads Burlington Northern and Union Pacific, sought merger with a faltering Southern Pacific. Although officials of both carriers were optimistic — going so far as painting some of each road's locomotives red and yellow with

Two BNSF SD40-2s in the road's first official paint scheme lead an eastbound intermodal train at Chana, Ill. The scheme is a modified version of an experimental dual livery applied in 1996 to SD60M No. 9297 to encourage employee feedback toward a corporate image. Chris Guss

SPSF lettering — commissioners denied the merger in July 1986, believing that it would be anti-competitive. Many of the lines of these two roads duplicated one another, and if united, customers' choices would be reduced. Unquestionably, SPSF stood for "Shouldn't Paint So Fast!"

While the ICC disappeared from the regulatory scene in the 1990s, the Surface Transportation Board, which lacked the extensive powers of its predecessor, continues in a supervisory capacity. By the dawn of the 21st century, the railroad map had mostly jelled: two giant roads in the East — CSX and NS — and two in the West — BNSF and Union Pacific. And Canadian companies had become an important part of the U.S. railroad picture, notably the CN's acquisition of the Illinois Central in 1998 and Canadian Pacific making additional acquisitions, highlighted by taking full control of the Soo Line in 1990.

MERGER DOWNSIDES

There were negatives to railroad mergers. One involved the human element. Consolidations usually meant workforce reductions. Shops, for example, might be closed or downgraded, and offices and departments consolidated. Conrail, for example, had no need for the Erie Lackawanna repair facilities in Marion, Ohio, or for its corporate headquarters in Cleveland. These could be trying times for both blue- and white-collar employees. If the "wrong" corporate culture took change, there might be a "brain-drain" of top executives. That was a contributing factor in why Erie Lackawanna, formed in 1960, quickly became "Erie-Lack-of-Money." Several talented former Lackawanna officials could not tolerate the mindset of top-ranking ex-Erie men. Shippers, too, might fuss and for good reason. Merged roads downgraded or abandoned service on redundant lines. Not all unwanted trackage would be sold to existing or start-up roads.

Whether for good or bad, the 20th century saw the evolution of giant rail powers. On the other hand, it experienced the rise of a plethora of regional and shortline carriers. These new or established railroads benefited from the giant roads shedding unwanted yet commercially viable trackage, passage of the Staggers Rail Act in 1980 which brought about partial industry rate deregulation, and attractive labor agreements. In places the railroad map resembled that of the mid-19th century, when small and modest sized mileage roads dominated. The 20th century experienced unprecedented mega-system creation and an explosion of smaller-mileage roads. Yet remarkably, no transcontinental railroad under a single corporate structure emerged.

"Really there was no need for a cost-to-coast railroad," explained veteran railroad official Kent Shoemaker in 2005. "There were financial and legal considerations, but inter-company agreements, including run-through trains, allowed for virtually seamless service. Of course, by the 1990s you had giant systems — take UP — that could handle traffic between the Pacific Northwest and Texas and Alabama."

As Shoemaker added perceptively: "The industry had reached a plateau of stability." ■

H. ROGER GRANT is a history professor at Clemson University. He's authored or edited more than 35 books and numerous articles, including 12 for CLASSIC TRAINS.

Remote-control railroading

HOW A 1920S INNOVATION BECAME PART OF RAILROADING'S BEDROCK

BY FRED W. FRAILEY

Amtrak's multi-track steel boulevard between Newark, N.J., and Philadelphia is a wonder to behold, hosting hundreds of passenger trains every weekday (and a few brave freights). That portion of the Northeast Corridor is as impressive in its own way as BNSF Railway's two-track "Transcon" freight corridor, the former Santa Fe Railway from Chicago to Los Angeles, on which — depending where you stand — 60 to more than 100 trains pass each day. Equally frenetic is Norfolk Southern's Chicago–Elkhart, Ind., main line, a tangle of freights and Amtrak trains vying for space on two main tracks. What prevents them all from descending into chaos is a technology devised 93 years ago by an engineer named Sedgwick North Wight.

CTC became an accepted technology on busy railroads everywhere.

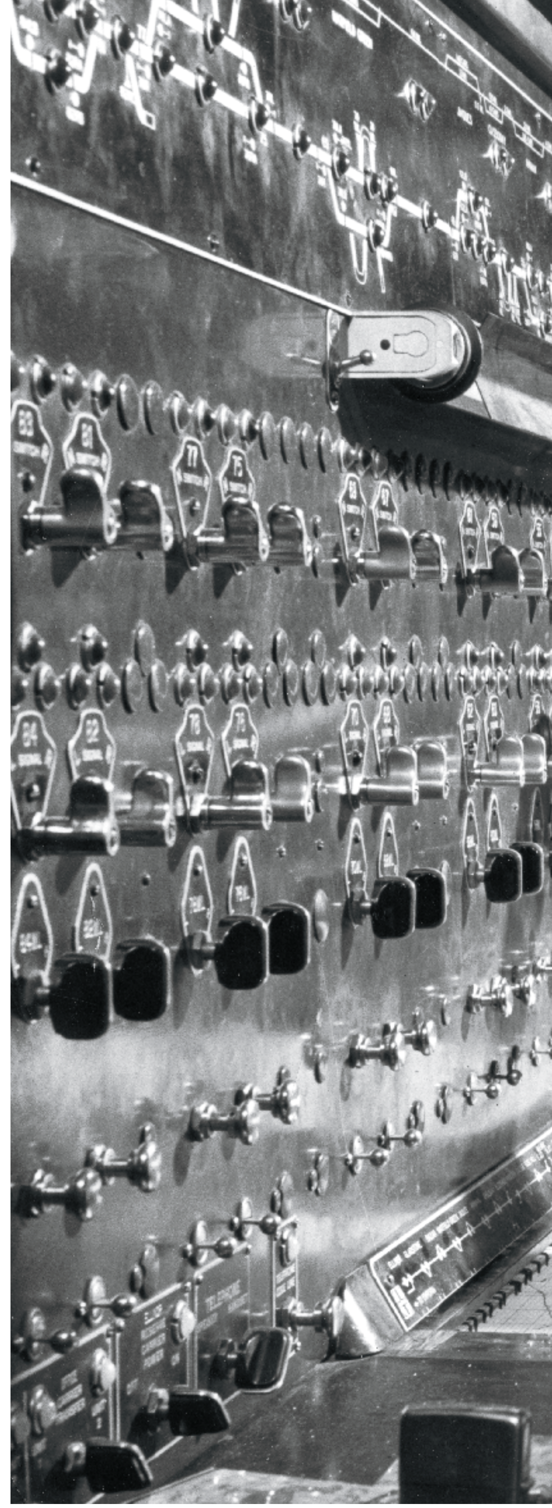
Wight spent his career at General Railway Signal Co. in Rochester, N.Y., and fathered a host of signaling breakthroughs, the greatest of which became known as centralized traffic control, or CTC. Before CTC, trains were directed by operating rules and written train orders dictated by dispatchers to station operators for delivery to crews. That system worked fine, to a point. But on-train employees had to align and realign track switches at meeting points, a time-consuming process that limited capacity, particularly on single-track routes. Plans, once made, were difficult for dispatchers to change.

Wight's system altered all that in 1927, when the Toledo & Ohio Central, a New York Central subsidiary, cut in the first segment of General Railway Signal's CTC between Toledo and Berwick, Ohio, 40 miles of single track hosting about 36 trains a day. The dispatcher, in Fostoria, watched the progress of trains on a 5-foot-wide panel and controlled the signals and newly motorized switches from there.

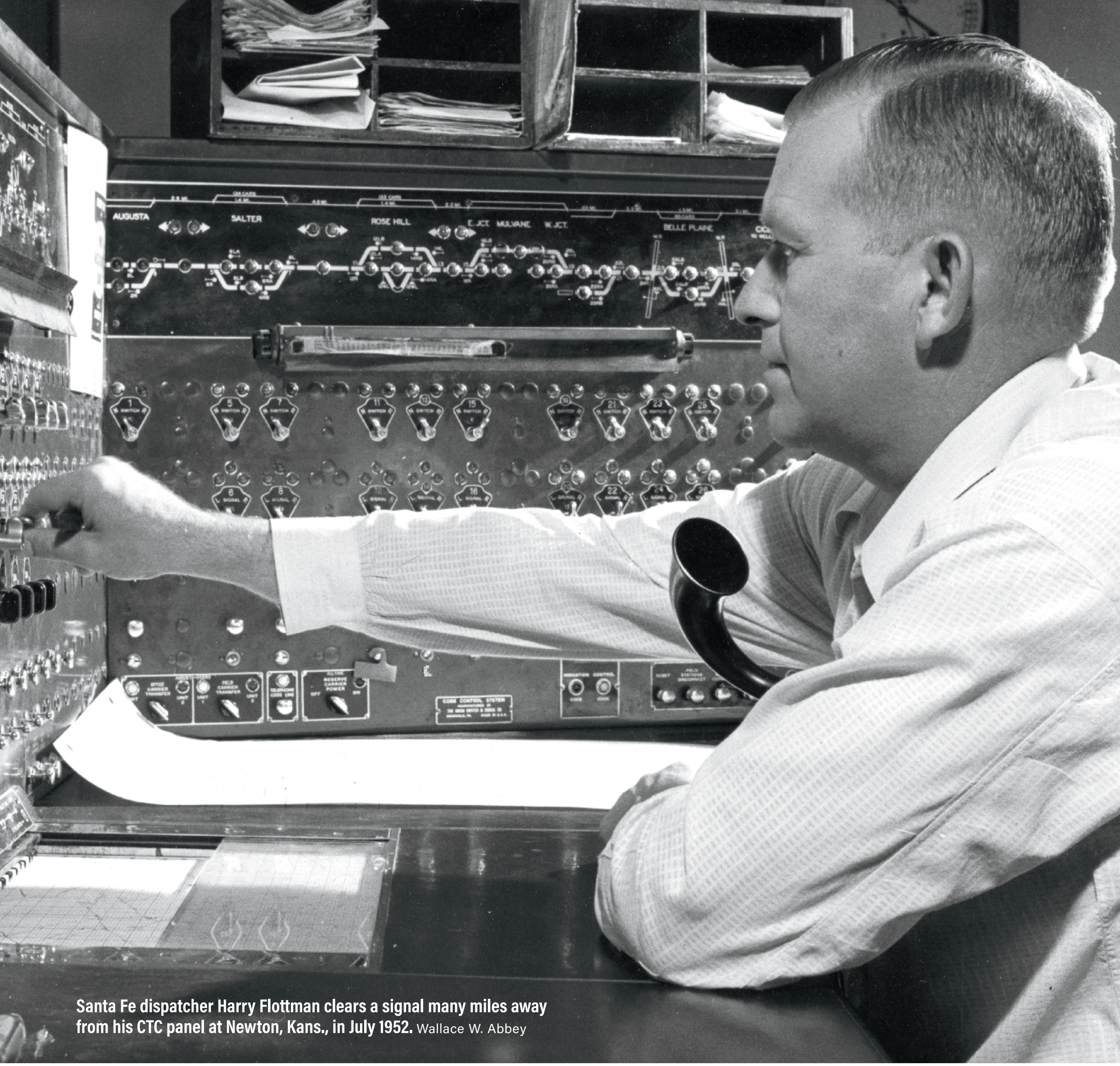
It's hard to imagine today a more revolutionary moment in the history of railroad operations. No more stops to align switches. No more written orders to interpret. No more armies of station and tower employees to deliver those orders. Dispatchers could devise plans for meeting trains minutes before the fact, not hours. Ultimately, CTC made brakemen superfluous on road freights. But while CTC nearly doubled the capacity of a main track, it caught on slowly. Soon came the Great Depression, reducing traffic and bankrupting many railroads. CTC was initially used mostly on secondary lines.

World War II became the catalyst to prove the worth of CTC. Besieged by traffic across New Mexico, the Santa Fe kept fluid by installing 202 miles of CTC during 1944–45, and soon thereafter extended it to eastern Kansas. Earlier in the war, Santa Fe also put CTC on its busy line between Los Angeles and San Diego. Other early adopters included Cotton Belt, Rio Grande, Seaboard, and Union Pacific.

Soon CTC became an accepted technology on busy railroads everywhere. In the 1950s, NYC President Alfred E. Perlman reduced most of his railroad's New York–Chicago trunk from four tracks to two, thanks to the bidirectional capabilities of CTC, and closed 135 interlocking towers. Oddly, NYC's rival, the Pennsylvania, stood largely aloof from the cost savings and other advantages of CTC, preferring to direct traffic on its busiest routes from dispatchers through manned towers.



The development and refinement of CTC has never ceased. For instance, could computer power be harnessed to CTC and make traffic-control decisions, in effect replacing human dispatchers? Early efforts to do this at UP didn't pan out. Yet for 20 years NS, with GE-Harris Railway Electronics, has sought to make computerized CTC dispatching reliable. The GE-Harris Movement Planner software determines where all meets and passes will occur, its goal being to get every train to its desti-



Santa Fe dispatcher Harry Flottman clears a signal many miles away from his CTC panel at Newton, Kans., in July 1952. Wallace W. Abbey

nation as near to on-time as possible.

Movement Planner is controversial. It can be counterintuitive, delaying a hot train that's ahead of schedule to advance a lower-priority train that is late. It is only as smart as the information it's fed, and its appetite for information is limitless. Explains an NS operations veteran: "It has to know about everything — maintenance windows, where and when trains will enter the network, whether there's space at terminals to take inbound trains, when unscheduled trains will operate, where switching will occur en route, when trains from other railroads will show up, and on and on. Does it work? Generally, yes."

Sedgwick Wight was honored for his engineering discoveries by Philadelphia's Franklin Institute in 1947, and later he would invent systems related to air-traffic control. General Railway Signal was absorbed by Alstom in 1998. Jackson Street Tower in Fostoria, home to that first CTC console, is long closed but still stands, boarded up. The console itself was given to the Smithsonian Institution, in one of whose attics it presumably rests today. The line that hosted the first CTC installation was abandoned by Penn Central.

As for centralized traffic control, it remains part of the bedrock of railroading. Without it, railroads as we know them probably could not function. Think about that the next time you're barreling up the Northeast Corridor toward New York. ■

FRED W. FRAILEY has contributed feature articles, photos, and columns to TRAINS *since the 1970s, but this is his first CT byline.*

GOVERNMENT STIFLED COMPETITION

Constraining commerce

BY MICHAEL W. BLASZAK

Imagine running a business where the government controlled most everything you could do. Raise or lower your prices? If your customers or competitors objected, the government could first suspend and later roll back the changes. Offer a new service? The government could intervene and say no. Eliminate unprofitable operations? Affected customers could block the way by complaining to the government that the public interest required them. Combine with another company? Only if the government gave you permission.

Stalinist Russia? No, the American railroad industry under the Interstate Commerce Act in the mid-20th century.

Strangely enough, many 19th century railroads aided and abetted the drive toward federal regulation that began with the original Act in 1887. Already there were too many railroads, and price competition along with shipper demands for political action to lower rates threatened their viability. The Act precluded rate regulation by the individual states, which the railroads feared, by creating the Interstate Commerce Commission to serve as a repository for publicly filed tariffs that had to be "reasonable and just."

But that standard was vague, and amendments were required to make it enforceable. The 1903 Elkins Act outlawed the under-the-table rebates that large shippers demanded to undercut their competitors. In 1906 the Hepburn Act empowered the ICC to set maximum

Nature is reclaiming once prosperous Central of New Jersey trackage at Taylor Yard near Scranton, Pa., in early 1971. Regulation hindered railroads' ability to seek new traffic or abandon unneeded infrastructure. Peter Rickershauser

— AND PROMOTED SAFETY — FOR ALMOST A CENTURY

rates, and the Mann-Elkins Act of 1910 permitted the ICC to suspend proposed rate increases until the railroads could prove they were reasonable.

These changes stabilized prices, but did not address the uncontrolled growth of the rail network, which ballooned from 137,000 route-miles in 1887 to 254,000 in 1916. After widespread congestion stalled shipments during World War I, the federal government took over management of the rail industry in 1917. The United States Railroad Administration implemented many common-sense coordination projects, leading legislators to think more comprehensive regulation of the industry could finally solve "the railroad problem."

As control of the railroads returned to their stockholders after the war, Congress passed the Transportation Act of 1920, which imposed broad new restrictions on management prerogatives. Now, if a railroad wanted to build a new line, the ICC had to approve. Likewise, abandonment of existing lines was subject to ICC approval. Not only did mergers of railroads have to pass the ICC's scrutiny, but also the Commission was mandated to oversee the consolidation of the fragmented network into a "limited number of systems," and a proposed merger that was inconsistent with the master plan was not likely to win approval.

Separate federal legislation assigned responsibility for regulating railroad safety to the ICC, once more precluding the states from making their own rules. The 1893 Safety Appliance Act required air brakes controlled from the locomotive to stop trains, along with automatic couplers and secure grab irons on cars. Amendments set requirements for ladders, sill steps, and hand brakes. In 1911, the Boiler Inspection Act extended federal control to locomotives. Ultimately, safety regulation was transferred to the Federal Railroad Administration in 1967, after the Department of Transportation was created.

As the 1920s dawned, virtually every aspect of railroad operation was under federal regulation. Railroads had to charge their customers the applicable rate in the tariffs they filed with the ICC — no more, no less. If they wanted to change those rates, they had to give advance public notice, answer protests from shippers and competing carriers, and hope the ICC would not find the new tariffs unreasonably high or low. Locomotives and cars had to meet federal safety requirements, and a new mandate to begin installation of automatic train stop technology came down in 1922.

Because of the pervasive web of laws and ICC rules, enormous quantities of management and legal effort were consumed by the regulatory apparatus. Railroads came to accept these expenses as a cost of doing business, but regulation had a more sinister effect by making the companies conservative and risk-averse. Why try anything radically different if the government may block it? Might as well keep earning the safe return the ICC allowed on the traffic already moving on the rails. And so the structure and technology of the industry stayed mainly the same.

Nothing came of the 1920 Act's consolidation mandate; the railroads did not agree with the mergers proposed by the ICC's consultants, and numerous bankruptcies during the Great Depression made the issue moot. The decades of the

Regulation came about to protect the interests of the shippers (some of which are visible in this view on the Chicago, Burlington & Quincy at Corning, Iowa) from what the public viewed as overly powerful railroads, especially in the Midwest. Henry J. McCord

1920s and 1930s, though, brought the first stirrings of competition for the freight and passenger transportation business the railroads dominated. The spread of paved roads and availability of cheap fuel encouraged the development of motor carriers that offered quicker and more nimble service. Federally funded waterway improvements boosted barge traffic, while pipelines became a practical means for transporting gases and liquids over long distances. Congress responded by extending the ICC's jurisdiction to cover highway and waterway transport, but the Commission did little to protect the railroads from these new competitors.

The abundant traffic of World War II, followed by the economies of dieselization, provided a temporary respite from the industry's financial issues. However, trucks continued to capture more business once wartime gas rationing expired. Early piggyback technology for carrying truck trailers by rail had emerged as early as the 1920s, but most railroads refrained from experimenting with intermodal service until after the ICC ruled in 1954 that it did not violate the regulatory scheme. Trailer-on-flatcar volumes grew healthily thereafter, but trucks were still faster and more flexible.

Since raising rates was slow and difficult because of the regulatory process, the railroads focused on cutting their costs to remain profitable. Mergers, by eliminating redundant facilities and employees, were a favorite strategy in the 1950s and 1960s. The ICC generally approved the proposals that came before it, but two important conditions diluted the potential efficiencies. Surplus employees were granted up to four years' income protection, and the merged railroad was required to keep pre-merger interchanges and rates with other carriers open. Merger proceedings also took a long time. The acquisition of Rock Island by Union Pacific and Southern Pacific, proposed in 1964, was not approved until 1974, and the conditions which the ICC attached to the approval were so unworkable that UP abandoned the deal.

Since raising rates was slow and difficult because of the regulatory process, railroads focused on cutting costs.

When a sharp recession caused profits to nosedive, Congress threw the industry a lifeline with the Transportation Act of 1958. This Act permitted railroads to reduce rates without ICC interference to capture more traffic, as long as costs were covered. But in practice little changed. This Act is better remembered for empowering the ICC to authorize discontinuance of intercity passenger trains, taking that power away from state regulatory agencies. As new jetliners emptied the Pullmans, the railroads aggressively cut back their increasingly unprofitable passenger services during the 1960s with the ICC's concurrence.

Amtrak provided a long-term resolution of the passenger issue, but by its 1971 inauguration a host of other maladies had debilitated the railroad business, including continued diversion of freight to other modes and the accelerating de-industrialization of the Northeast. Inflation exacerbated these problems. Starting in 1965, the value of the dollar sank steadily downward, with inflation peaking at 14 percent in 1980. While the cost railroads paid for rail, ties, rolling stock, fuel, and employees kept going up, the revenue the railroads earned for transportation could rise only when the ICC authorized rate increases. Shippers, though, fought the hikes relentlessly, and when the Commission finally acted the relief was generally less, and usually came far later, than the railroads requested.

The consequences were disastrous. The two largest Eastern railroads, Pennsylvania and New York Central, combined in 1968 with the intention of cutting costs, but Penn Central couldn't achieve economies fast enough to avoid bankruptcy in 1970. Within three years six other roads in the East were also bankrupt. Rock Island declared bankruptcy in 1975, followed by Milwaukee Road in 1977. Even solvent railroads were earning such minuscule returns on investment that eventually, inevitably, they also would be unable to raise the capital needed to continue running.

Penn Central's failure induced the federal government to change its regulatory course, not the least because the bankruptcy court forced the government to funnel money into the railroad to prevent it from shutting down. The government took control of restructuring the Eastern bankrupts into a single new carrier, Conrail, in 1976. Billions of federal dollars

Federal regulation

1887 Interstate Commerce Act – The ICC is formed

1893 Safety Appliance Act – Air brakes and automatic couplers mandated

1903 Elkins Act – Rebates outlawed

1906 Hepburn Act – ICC empowered to set "just and reasonable rates" upon complaint

1910 Mann-Elkins Act – ICC empowered to set rates without complaint and suspend proposed rate increases

1911 Boiler Inspection Act – Extends federal oversight to locomotives

1913 Valuation Act – ICC directed to determine value of railroad property to impose fair rates

1920 Transportation Act – Regulation of mergers, construction, and abandonment

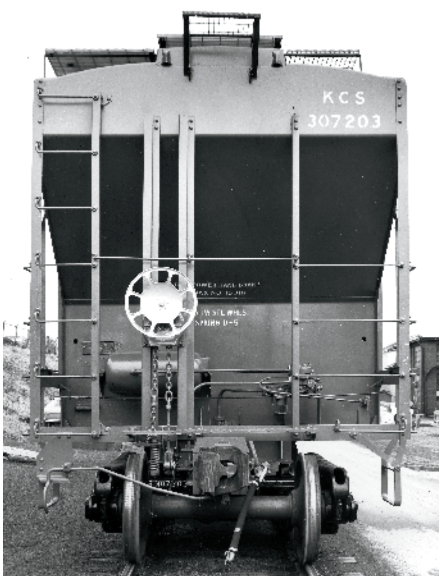
1880 1890 1900 1910 1920

purchased the bankrupt lines' desirable routes — the rest were summarily abandoned — and overcame their decades of deferred maintenance.

The Railroad Revitalization and Regulatory Reform Act of 1976, through which this investment was made, also included modest measures to improve the industry's finances, such as more freedom to raise rates in response to rising costs. But the reforms were insufficient, and Conrail's management became the leading advocate for a more radical cutback of Washington's regulatory oversight. The federal government, led by President Jimmy Carter, was receptive to Conrail's arguments that the marketplace, not the ICC, should be primarily responsible for determining what services railroads should offer, and how much they should cost, especially since Conrail remained, as a whole, unprofitable.

What became known as the Staggers Rail Act of 1980 swung the pendulum of regulation decidedly in the direction Conrail and Carter desired. The ICC now could intervene in rate disputes only when the railroad had "market dominance,"

Conrail makes its last run on the Maybrook Line in New York in 1982, ending 93 years of rail service in the region. Deregulation at the end of the 20th century made it easier for railroads to end service on marginal lines, boosting the health of the entire industry. Peter D. Barton



Regulation also brought about safety improvements, like air brakes, automatic couplers, and secure grab irons. Classic Trains collection

meaning that the traffic was extremely profitable. Railroads and shippers could enter into confidential transportation contracts which were exempt from the tariff filing requirement. The Act included two features particularly important to Conrail: the right to cancel through rates and to impose surcharges when divisions of those rates made the movement only marginally profitable. Staggers also expanded the ICC's authority to exempt traffic from regulation where competitive alternatives existed, which the Commission soon used to deregulate intermodal, boxcar, and other movements.

In return for these advantages, the Staggers Act ended the long-standing practice whereby railroads collectively set their rates through rate bureaus, which made rates the same no matter which route a shipper chose. Railroads now had to compete on price, which placed a premium on large networks under unified management. Fortunately, the Act also lowered the bar for approval of mergers and imposed strict time limits on approval proceedings, and the ICC decided to drop its insistence that the merged carrier maintain all its pre-merger gateways. Within 20 years the railroads had coalesced into four major U.S.-based systems, two in the East and two in the West, achieving the goal the Transportation Act of 1920 had set. And the ICC itself passed into history, succeeded in 1995 by the Surface Transportation Board with greatly diminished authority.

Following deregulation, the railroads were free to decide what services they would provide, and in most cases how much to charge for them. They soon learned what produced adequate profits, and stopped doing what didn't. Rates of return rose, and the railroads once again gained access to the capital markets. While safety is still regulated by the FRA, Washington no longer manages how railroads run their business, and as a result America's railroads are strong, profitable, and self-sustaining. ∎

MICHAEL W. BLASZAK, a Chicago attorney, has represented many railroad, shipper, and public interest clients before the Interstate Commerce Commission and Surface Transportation Board since 1976. This is his fourth article in a Classic Trains publication.

1958 **Transportation Act** – Permits rate reduction without regulatory interference; expands ICC jurisdiction over passenger train discontinuance

1973 **Regional Rail Reorganization Act** – Establishes framework for rescue of bankrupt Northeastern railroads

1976 **Railroad Revitalization and Regulatory Reform Act** – Conrail created; modest rate reforms provided

1980 **Staggers Rail Act** – Deregulation, finally!

1995 **Interstate Commerce Commission Termination Act of 1995** – Transfers regulatory authority to new Surface Transportation Board

1960 1970 1980 1995

Fulfilling the promise of

Picture a typical freight train of the early 1920s. On the head end is likely a 2-8-2, a locomotive whose essential design can be traced to the turn of the century. Strung behind it is everything the yardmaster can muster: 60, 80, perhaps 100 cars if the geography is right. Once they get the highball, the engine crew will have a challenge getting over a 100-mile district within the federal designated limit of 16 hours. It won't be easy. Average freight-train speed immediately after World War I was 11.2 mph.

Welcome to railroading's drag era, a time when locomotives were rated by tractive force, when speeds were slow, and when customers got their freight, well . . . when it got there. Suddenly, though, none of that would be satisfactory as the U.S. moved beyond the war and the railroads emerged from the shadow of brief nationalization. The Roaring '20s beckoned, with the promise of industrial expansion, better highways, and increasingly capable trucks.

HOW A SMALL LOCOMOTIVE BUILDER DEVELOPED A WINNING FORMULA FOR THE FUTURE

BY KEVIN P. KEEFE

steam

Nickel Plate 779, built by Lima in 1949 as the last of the road's 80 fast-freight 2-8-4s, hurries along Lake Erie west of Lorain, Ohio, in 1957. John A. Rehor

Santa Fe 2915, from the road's final order of Baldwin 4-8-4s, heads west at Victorville, Calif., with a Shriners' special in June 1950. Stan Kistler

All three of the major locomotive builders — American (Alco), Baldwin, and Lima — would ponder these challenges, but it would be Lima that got there first with a practical solution. The company called it Super Power, and it would be a game-changer for steam, leading to a brief but spectacular final act before the inevitable victory of the diesel.

The die was cast, and Lima's Super Power became the guiding philosophy for everyone, even if Alco and Baldwin avoided the term.

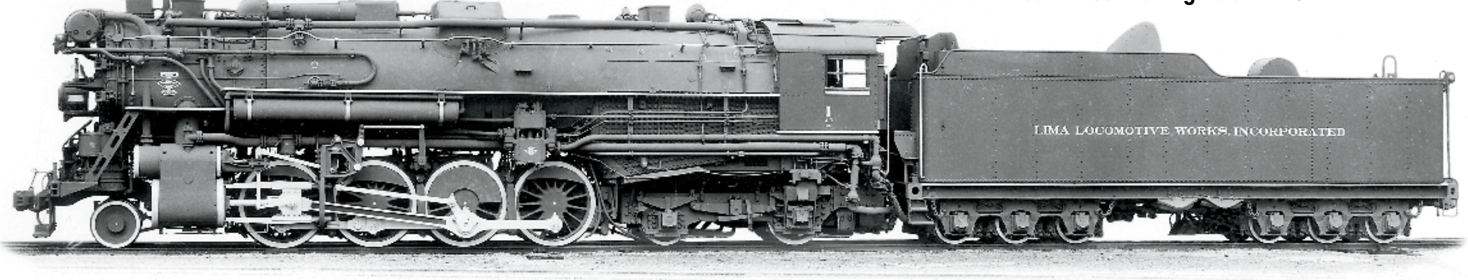
Lima's rise is one of railroading's great David vs. Goliath stories. Originally a small Ohio agricultural and sawmill equipment company, Lima began making a name for itself in the 1880s with the geared Shay locomotive, superbly suited for logging, mining, and quarry service. When Lima reorganized in 1915 to concentrate on rod engines, the firm established a new design group led by William E. Woodard, a brilliant young engineer recruited from Alco.

Woodard quickly made his mark. He believed steam locomotive performance was limited only by current convention. He concluded that builders couldn't stick with ever-larger versions of rigid-frame engines such as the 2-8-2 or 2-10-2. They were becoming too heavy owing to the limitations of bridges, clearances, and other physical-plant factors. The best Mallet articulateds — notably the 2-8-8-2 — could pull like crazy but were slow. For Woodard, the answer lay in creating a new generation of locomotives designed to provide higher horsepower, which was the emerging standard for rating steam, and the key to horsepower was a more powerful boiler. This led to Lima's central innovation: a larger firebox matched with a four-wheel trailing truck to support it.

Lima owed much of its initial success to a demonstrator, designated A-1, the first locomotive to embody most of what the builder considered the Super Power essentials. Lima had already constructed an earlier demonstrator, a "super" 2-8-2 for New York Central in its H-10 class, No. 8000. Rolled out in June 1922, the 8000 included many of the Lima innovations, and it performed well. But it lacked that essential four-wheel trailing truck, hence was unable to fully exploit the promise of a more robust boiler.

That promise would be fulfilled in February 1925 with the A-1, the first of the 2-8-4 wheel arrangement. In an unusual move, Lima constructed the engine on speculation. Once again, it was New

Lima's A-1 2-8-4 of 1925 was the first locomotive with a firebox big enough to require a four-wheel trailing truck. Lima



The ultimate in Lima Super Power was the 2-6-6-6 Allegheny type. Chesapeake & Ohio 1603, one of 68 built, packed 7,500 h.p. C&O

York Central that stepped forward to give the new locomotive a try, on its Boston & Albany subsidiary. Unveiling the A-1 at a ceremony in Lima, company President J. S. Coffin called it "the finest piece of machinery I've ever seen."

Coffin had reason to boast. The A-1 had a firebox with 100 square feet of grate area, a record for a rigid-frame locomotive. It had that all-important four-wheel trailing truck. It also featured a new ash-pan design that improved airflow through the firebox; cast-steel cylinders with integrated steam passages; and an operating boiler pressure of 240 psi, 20 percent higher than the H-10's 200 psi.

Although the trade press initially called the 2-8-4 a "Lima," the name "Berkshire" began to catch on once it went to work on the B&A on March 28, 1925. Outfitted with a small wooden shelter on the pilot beam to protect technicians, the locomotive also hauled parent NYC's dynamometer car. Over the ensuing two weeks, the A-1 took trains through the Berkshire Hills of western Massachusetts, between Selkirk Yard, near Albany, and Washington, Mass., 60 miles of tortuous curves with a heavy eastbound grade. The test period included winter and spring weather, obliging the A-1 to perform on track that was variously icy, wet, and dry.

The trials were an unqualified success. On April 14, 1925, the A-1 handled 26 percent more tonnage in 57 fewer minutes across the same miles as the H-10, all while setting records for boiler efficiency, drawbar horsepower, and coal and water consumption. Lima later sent the 2-8-4 on a successful barnstorming tour of several railroads including Illinois Central, Milwaukee Road, Missouri Pacific, and Chesapeake & Ohio.

It's interesting to speculate about the reaction in the design departments at Schenectady and Eddystone as news about the A-1 trickled in. Both Alco and Baldwin were working on their own ideas for a next generation of steam. Baldwin, especially, made a high-profile splash with its 4-10-2 No. 60000 of 1926. The 60000 was anything but conventional, with its water-tube firebox, extremely high boiler pressure of 350 psi, and use of a two-stage, three-cylinder compound engine. But its own demonstration tour failed to attract any orders.

The die was cast, and Super Power became the guiding philosophy for everyone, even if Alco and Baldwin avoided the term. Eventually, most of the great machines coming out of all three plants — think Chesapeake & Ohio's 2-6-6-6, Santa Fe's 4-8-4, or Union Pacific's 4-6-6-4 — would owe a substantial debt to the 2-8-4 that conquered the Berkshires in 1925.

Technological revolutions aren't always rooted in complexity. Solutions are often rather simple, even elegant. That certainly applies in the case of Lima and Super Power. As steam historian Ed King puts it, "Super Power won out principally because it represented the least deviation from standard locomotive design practice. Super Power only required a larger but very conventional firebox and boiler, but that was the path to higher horsepower and speed." It also kept the steam locomotive viable for another 20 years.

Alco and Union Pacific jointly designed the first 4-6-6-4s in 1936. The builder supplied the road with 105 Challengers through 1943; No. 3821 was built in 1937. Robert Hale

KEVIN P. KEEFE is author of Twelve Twenty Five *(Michigan State University Press, 2016), about the Pere Marquette 2-8-4 he helped restore for excursion service.*

BY JERRY A. PINKEPANK

Black diamonds *from the* Great Plains

Before the 1970s, most of the coal burned in America came from the eastern U.S., relatively close to the main electric generating markets. These coals had a heating value about 50 percent higher than those of the Powder River Basin in Wyoming and Montana, which came to prominence after passage of the Clean Air Act of 1970.

The huge issue, though, was sulfur content, as the western coals had less than half that of eastern U.S. coals. Moreover, Powder River coals are extraordinarily cheap to mine, as they are found in seams of 50 to 70 feet in thickness, located just below the surface. Appalachian coals occur in seams 3 to 6 feet thick, and most often must be reached by expensive shaft mines. The result is that contract prices for Appalachian coal were about one-quarter those of Powder River coal.

The growing demand for Powder River coal prompted Burlington Northern to build a new 116-mile line to serve mines in northeast Wyoming. Called the Orin Line, it opened in October 1979. Chicago & North Western, with backing from Union Pacific, gained access in 1984 at the behest of the Interstate Commerce Commission.

As public environmental awareness increased in the 1960s, utilities began designing new power stations around Powder River coal. Several power plants were being designed and built for other utilities based on unit-train delivery of Powder River coal, but in April 1970 Chicago-

DEMAND FOR LOW-SULFUR COAL WAS A BONANZA FOR WESTERN RAILROADS

land's Commonwealth Edison received the first. The majority of this coal originated at the Cow Creek mine in Montana.

Cow Creek coal was hauled east in 105-car trains via BN's former Northern Pacific to St. Paul, Minn., thence via former Chicago, Burlington & Quincy lines to Peoria, Ill., where they were interchanged onto ComEd's common-carrier rail subsidiary Chicago & Illinois Midland. C&IM hauled them 39 miles south to an Illinois River barge dumper at Havana, Ill. Another origin for the coal was the Kleenburn mine, a historic operation on the old CB&Q in Wyoming, and operated in 50- to 55-car trains via ex-CB&Q lines through Alliance and Lincoln, Nebr., to Galesburg, thence to Havana. Cars from both origins were a mix of BN and C&IM ownership.

In the 1960s, demand for electricity had been increasing from 5 to 9 percent a year, compounded, and this was expected to continue. The Clean Air Act ensured that much of this growth would use low-sulfur Powder River coal. BN set rates that encouraged utilities to own the cars, so the railroad could conserve its scarce capital for the $2 billion in track construction and other improvements that it determined in a 1974 review would be required. That turned out to be just a down payment. In 1974, Wyoming and Montana mines produced 34.8 million tons of coal, equivalent to 8⅔ 11,000-ton (net) trains per day. In 1979, when BN completed the Orin Line, from there north to Gillette, that opened rail service to seven of the most productive mines in the Basin (and a relief route for the rapidly growing traffic), the total was 104.2 million tons, equivalent to 26 trains a day.

In 1984, when C&NW/UP got access to the Orin Line mines, the total was almost 164 million tons, equal to 41 trains a day. By 1995, the year UP absorbed C&NW and BN merged with Santa Fe to form BNSF, the figure was 303 million tons, and the typical train carried 13,000 tons, the equivalent of 64 trains a day.

The early coal unit trains didn't involve significant new infrastructure or locomotive investments, but that changed. During 1973–82, BN installed 572 miles of sidings and additional main tracks (in addition to the new Orin Line), 1,246 miles of centralized traffic control, and relayed 3,215 miles of track with heavier rail. BN acquired 732 new diesels just for coal service (EMD SD40-2s and GE U30Cs, mostly), and to support them, built the giant Alliance (Nebr.) diesel shop, with 750 units assigned there for maintenance.

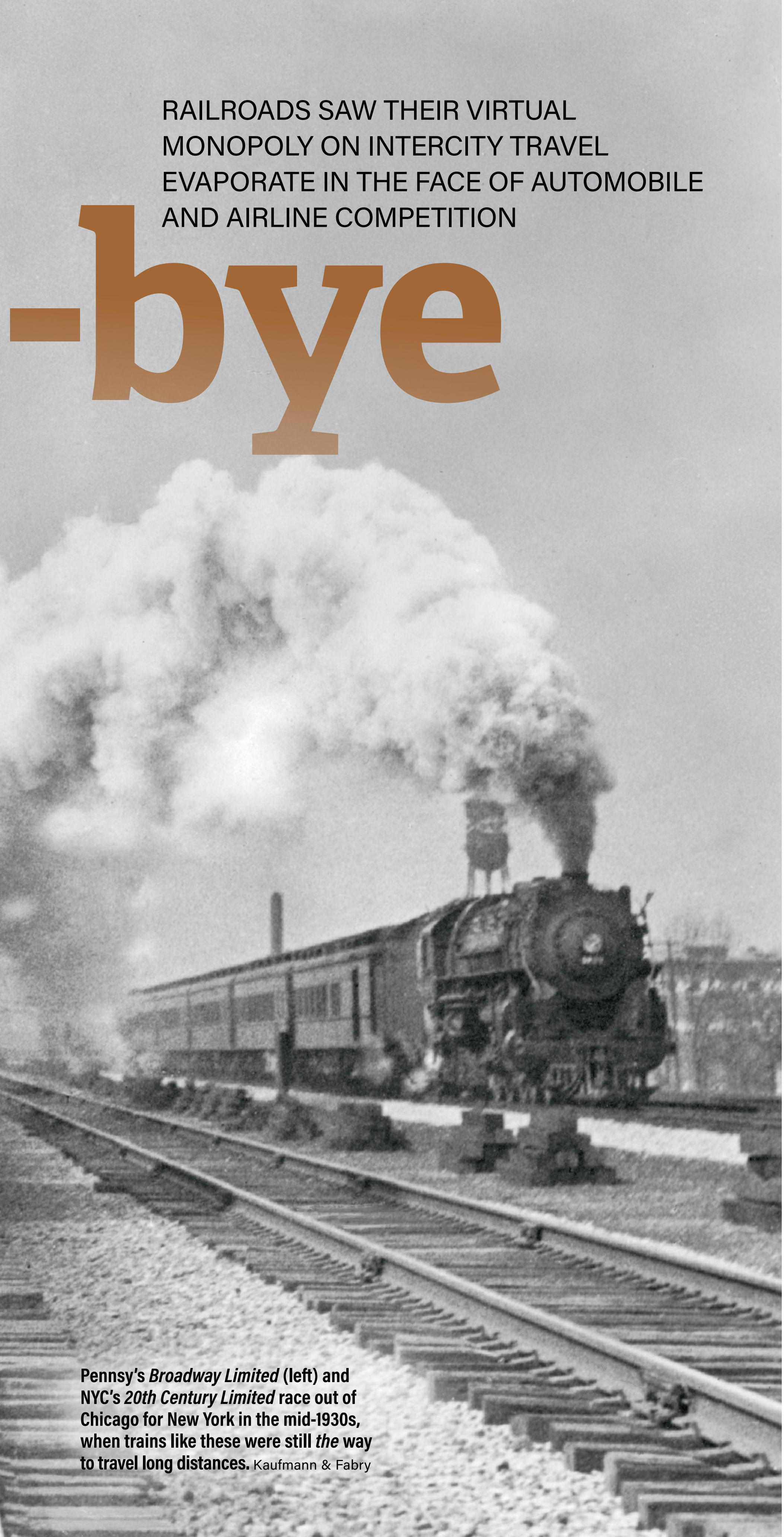
As coal volume continued to grow, so did the infrastructure and locomotive investments. A major development was EMD's SD70MAC, the first application of alternating current to production diesel-electrics. BN ordered 350 at a crack for $675 million; eventually, 819 were built just for BN and BNSF, all for Powder River coal service. The investments just kept going into the new century until peaking in recent years as the shift away from coal at many power plants has occurred with the drop in natural gas prices. ∎

Burlington Northern and Union Pacific coal trains converge in May 1995 at Converse Junction, near the midpoint of the 116-mile line BN opened in 1979 to access mines in northeastern Wyoming. Robert S. McGonigal

The long good

-bye

RAILROADS SAW THEIR VIRTUAL MONOPOLY ON INTERCITY TRAVEL EVAPORATE IN THE FACE OF AUTOMOBILE AND AIRLINE COMPETITION



Pennsy's *Broadway Limited* (left) and NYC's *20th Century Limited* race out of Chicago for New York in the mid-1930s, when trains like these were still *the* way to travel long distances. Kaufmann & Fabry

BY JOE WELSH

Railroads entered the 20th century as the unchallenged kings of intercity travel. Travel by boat was slow and limited by the location of navigable waterways. Automobiles were few and fragile — and there were no highways on which to drive them. Powered flight was not yet a reality.

Created in the boundless optimism of the 19th century, the nation's railroads expanded mightily, with trains linking cities far and wide. But it wouldn't be until the late 1800s that passenger trains attained iconic status, as Americans gained wealth and the railroads created beautiful trains to carry them. The passenger train went from spartan necessity to status symbol, a fine hotel on wheels.

It was against this backdrop that, on June 15, 1902, America's two greatest railroads expanded their passenger service while creating what would become the two of the nation's greatest passenger trains: the New York Central's *20th Century Limited* and the Pennsylvania Railroad's *Pennsylvania Special* (later named the *Broadway Limited*). Both trains linked America's two largest cities, New York and Chicago. Both operated on fast 20-hour schedules. They made headlines for years, first for their audacious speed, and later for the celebrities who rode them. Carrying only dining, lounge, and sleeping cars — but no coaches — both would be synonymous with luxury.

By 1900 the U.S. was the largest producer of steel in the world. It dominated the oil industry and had established itself politically as a world power. Henry Ford would establish the Ford Motor Co. in 1903. By the 1920s millions of new autos were being sold every year and federal assistance was creating a network of all-weather highways. This helped doom short-distance rail service, but the railroads still overwhelmingly dominated intercity and long-haul travel. The flush times of the 1920s saw the railroads introducing new passenger trains every year and routinely operating

UP's 1936 *City of Denver* was one of the early streamliners that helped railroads reinvigorate their passenger business. Dan Peterson

trains in multiple sections. But the Great Depression, which began in 1929, changed the industry for good. What had once been a glorious business in the 1920s went into significant decline.

The Depression hit the industry hard. As a result of this economic collapse, the railroads experienced unprecedented declines in ridership. For example, the Pennsylvania, the nation's largest passenger carrier, suffered a 55 percent drop in passenger revenue between 1929 and '35.

STREAMLINERS TO THE RESCUE?

Desperate to regain ridership, beginning in 1934 the railroads introduced the streamliner. Carriers spent lavishly to change their stodgy image of dark green passenger cars and black steam locomotives. Beautiful new trains made headlines wherever they ran. Up front, sleek diesels began replacing steam power. But the losses continued to mount. Nationally the rail-passenger service annual operating deficit reached $233 million in 1936, a loss equivalent to 26 percent of the operating income earned from freight service. Four years later, a year before America entered World War II, the annual deficit had reached $262 million ($4.7 billion in today's dollars). And the railroads were now in a battle for survival against the expanding motor carrier industry.

The war reversed the losses in passenger traffic. During the conflict, restrictions on gasoline, rubber, and auto manufacturing curtailed intercity travel by auto significantly. The burden of carrying intercity passengers fell to the railroads. Passenger-miles traveled by auto dropped to a multi-year low in 1943, the same year net rail passenger operating income reached a high point for the period. Commercial aviation, then in its adolescence, offered little competition. Much if not all aviation manufacturing resources were focused on the military war effort. Annual commercial intercity passenger miles traveled by air during the war years were only 2 percent of the miles traveled by rail.

Country trolley operations like Pennsylvania's Conestoga Traction Co. siphoned traffic from local trains. Automobiles accelerated the trend in the 1910s. William Moedinger Jr.

Some measure of the railroads' incredible importance during the conflict can be determined by noting that during World War II just the Pullman cars operating over the railroads carried 125 million passengers. New York's Penn Station, the nation's busiest passenger terminal, hosted 109 million visitors in 1945 alone — this at a time when the entire national population was approximately 130 million! As a result of all this traffic, from 1942 to '45 the national passenger rail deficit was eliminated. In 1943, the best year during the war, passenger trains earned almost $280 million nationally.

Despite the profits, the war had unwanted effects. Restrictions on materials and manufacturing led to shortages of equipment and parts. Operating beyond their nominal capacity, the railroads wore out their equipment and physical plant. They also overworked their employees and had to hire thousands of green new ones to replace experienced men called off to war.

Worse, the war traffic had no long-term positive economic effect on the passenger train. As vital as passenger trains were during the conflict, the war was but a brief interlude in the downward slide of their profitability. By 1947, just two years after the war, according to the Interstate Commerce Commission not a single Class I railroad was making a profit from carrying passengers.

(Many of the statistics in this article are drawn from a 1951 ICC report on the passenger train deficit. It is important to note that when internally analyzing an indi-

vidual train or an entire passenger service category's performance and profitability, railroads used formulas and techniques which differed from railroad to railroad. The ICC statistics are used here because they represent the only basis for quantifying the national passenger problem.)

The railroads had been expecting a decline in their ridership and a renewed increase in competition from the auto and the airlines with the end of the war. And they were right to be concerned. By 1950 the intercity miles traveled by auto had already increased 44 percent over mid-war levels; commercial aviation passenger-miles increased by 155 percent during roughly the same period. These figures foreshadowed things to come.

POSTWAR SPENDING SPREE

Knowing this challenge was coming, and desperate to replace worn-out equipment, the railroads began placing massive orders with manufacturers for new, innovative trains even before the war was over. But the carriers would have to wait years for delivery.

Pullman-Standard, the largest, most experienced manufacturer of the nation's three major passenger carbuilders (the others were Budd and American Car & Foundry), sent their railroad customers a virtual form letter explaining the reasons for the delay. A slow, painful return to peacetime manufacturing meant shortages of materials. Likewise, even when they did get the necessary materials, the lack of skilled labor meant that work proceeded more slowly. The letters came with an interesting explanation for the labor shortage. Experienced European workers idled during the worldwide Depression of the 1930s had come from shipyards like Scotland's legendary John Brown & Co. to help Pullman build streamliners in Chicago. But during the war, these men had returned home to help their own countries.

America in the late 1940s had the most advanced passenger trains in the world.

When the postwar passenger cars finally did arrive, they marked the high point, equipment-wise, of the American passenger train. Indeed, the nation then had the most advanced passenger trains in the world. Hundreds of new cars arrived featuring innovations undreamed of just a decade earlier. Chief among these was the dome car, which capitalized on a principal advantage the passenger train had over its rivals — sightseeing. Streamliners traversing the West such as the *California Zephyr*, the *Olympian Hiawatha*, *Empire Builder*, and *Super Chief* gave passengers an eyeful of America's beauty. Not to be outdone, Union Pacific's trains from Chicago to Los Angeles and Portland offered the most innovative dome experience with dome dining cars.

But despite this massive investment in new equipment, the passenger-train operating deficit continued to grow. Labor costs had skyrocketed, and the regulated railroads couldn't raise fares fast enough to cover them. By 1951 the railroads were incurring an annual passenger operating deficit of $681 million. The loss was equivalent to 42 percent of the operating income the railroads earned from freight service. While the carriers had lived with passenger deficits for years, the increasing impact of them on their total corporate earnings was now a serious problem.

And the problem was occurring nationwide. Despite a perception that the Western railroads' passenger trains remained in the black, all the 61 passenger-carrying railroads reporting to the ICC noted that they were losing money carrying people. An ICC committee assembled in 1951 to address the situation called the passenger issue ". . . the most serious problem today confronting the railroads."

The railroads'passenger problem was multi-faceted and difficult to solve.

With the flexibility and low cost of the automobile luring the coach passenger,

Servicemen and civilians crowd the Pennsy's station at Richmond, Ind., during World War II. Record wartime traffic led the railroads to look to the postwar era with optimism. PRR

Railroads spent big on new trains in the late '40s, hoping for crowds like the one boarding NYC's *James Whitcomb Riley* at Cincinnati in 1952 (left). Alas, a nearly empty coach on LV's *Black Diamond* in 1959 (right) reflected American travel preferences. Left, Wallace W. Abbey; right, Jim Scribbins

and the growing airlines a significant threat to the lucrative Pullman and parlor-car trade, the railroads experienced a decline in their market share of intercity passenger miles. Yet they still needed to maintain their fixed investments such as right of way, stations, and yards.

Some of these facilities were located on large, valuable tracts of land and were expensive to maintain, all the while being taxed by the cities in which they were located. Those same cities were building airports with municipal bonds at no cost to the airlines. In the private-sector era of rail passenger operations, only one new station, New Orleans Union Passenger Terminal, was built that way. Even if a railroad simply improved a station (and therefore increased its value), the host city might increase the taxes on the facility.

Labor costs and practices were killing the passenger train and by extension killing future jobs for railroaders. Rules such as the 100-mile day for engine crews, and the need for a fireman even on a diesel locomotive, still existed. By example, a passenger engineer operating between Harrisburg, Pa., and New York on the Pennsylvania could do the 390-mile round trip in a single day with about 6 hours of running time on the main line, but would draw almost four days' pay.

The nature of the passenger train, with longer service hours for on-board crews, cost the railroads too. A Pullman porter on a 16-hour New York–Chicago trip was responsible for roughly the same number of passengers as a single flight attendant on a 2½-hour commercial flight on the same route, yet the cost per passenger of the porter's services was significantly more than the flight attendant's.

The heavily regulated railroads were also unable to raise their fees to keep up with the deficits they incurred. In the early 1950s, the PRR operated hundreds of passenger trains serving hundreds of destinations. It found itself unable to increase passenger fares by the 15 percent, mail fees by the 33 percent, and express fees by the whopping 90 percent it needed to address its passenger-train deficits.

The $71 million passenger loss Pennsy experienced in 1951 (the largest in the nation) amounted to 55 percent of the road's total freight earnings that year. Vice President of Operations James Symes summed it up from his perspective, "The value of the . . . passenger business that was such an important part of our economy for so many years has completely changed from an asset . . . to a very serious liability."

FROM ASSET TO LIABILITY

But getting out of the business entirely was generally not an option in the early 1950s — especially for large railroads. They had too much invested and too many people depended on their service. The PRR estimated in the 1950s that it had about a billion dollars invested in its passenger business. Speaking about this enormous investment, Symes noted, "You can't make money closing up the shop." He would eventually change his tune about eliminating intercity services. Most other railroads would do the same.

Unable to completely "close up the shop," as the 1950s progressed, most roads sought to maintain their best-earning trains, while eliminating those that earned little or lost money. Often these lesser trains linked smaller towns to hub cities, feeding traffic to the top trains. Eliminating them had the effect of unraveling the passenger-train network. And it cost the surviving trains business, worsening their bottom line as well. The story behind these service cuts was much more than accounting. It was about the death of passenger railroading in small-town America.

Businesses and communities in central Pennsylvania, for example, wrote letters to the Pennsy asking why their connections to the east-west main line at Harrisburg had been terminated, why weekend service had been canceled, or why their local set-out sleeper was no longer available. The railroad answered back frankly and respectfully that it could no longer afford to provide the service. And so, out of necessity, the automobile became the mode of choice for most people in central Pennsylvania. It was like that all over the country in the 1950s.

Even in the early '50s, some railroads also cut top trains when they were viewed as redundant. They also combined trains which ran on the same routes in an effort to cut costs but keep the revenues. New York Central combined its *Pacemaker* and the *Advance Commodore Vanderbilt* between New York and Chicago. Rival PRR combined its all-coach *Trail Blazer* and all-Pullman *General* beginning in 1951.

One thing the railroads were often still not prepared to do in the 1950s was cut money-losing service when they had direct competition from another road. A good example of this was the transcontinental sleeping cars the Eastern and Western roads transferred to each other at Chicago beginning in 1946. By most accounts, these car lines were expensive to transfer, poorly patronized, and lost money, and most of their passengers chose to leave the cars during the multi-hour layover between trains in Chicago anyway. Nevertheless, some railroads continued to operate these car lines until the late 1950s.

A PLAN FOR COOPERATION

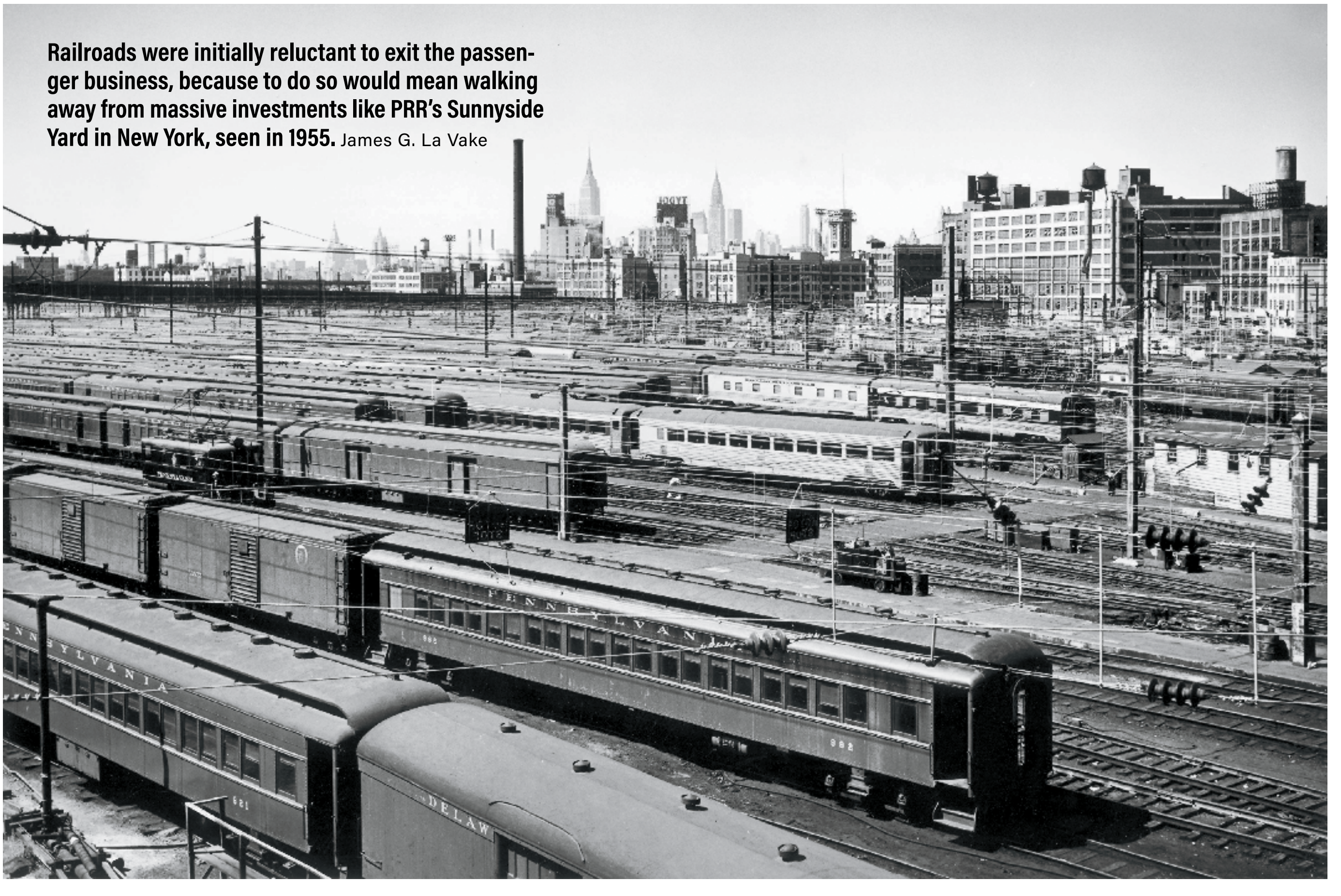
Thus it was no surprise that the railroads initially rejected advice to cut their losses by ceding an entire passenger market to a stronger competitor. In 1954 the consulting firm of Robert Heller & Associates delivered a report to the Eastern roads. It recommended a radical cooperation agreement among the carriers. Explaining the reason for the suggested changes, the report noted that $20 billion had been spent on highway construction since 1946, while 37 million autos had been purchased in the same period. Meanwhile, since 1942 the average hourly pay rate of passenger-service workers on Class I railroads had increased 125 percent. The report cited a then-prevailing airline practice of not operating service that duplicated another airline's service.

Getting out of the passenger business entirely was generally not an option.

The Heller plan recommended that the Baltimore & Ohio, NYC, and PRR cease to compete and start to cooperate in markets where competition was debilitating and fruitless. Among the recommendations it made were that PRR should handle New York–St. Louis traffic, while B&O operate the Washington–St. Louis route. It also recommended that B&O leave the New York–Washington passenger market and let PRR handle all the traffic.

Unable to stomach the quantum leap the report recommended, the railroads initially made no such changes. But competition from other modes continued to increase. In 1956 the nation embarked on the creation of the Interstate highway system. And it turned out that the Heller report actually predicted the future in some ways. In the late 1950s the Pennsy basically ceded the Washington–St. Louis market to B&O. And in 1958 B&O abandoned all passenger service north of Baltimore on its historic Royal Blue line.

But to the casual observer in the late



Railroads were initially reluctant to exit the passenger business, because to do so would mean walking away from massive investments like PRR's Sunnyside Yard in New York, seen in 1955. James G. La Vake

The death of the *California Zephyr*, the ultimate postwar "dream train," symbolized the critical state of the American passenger train. Dan Pope coll.

1950s and early '60s, some railroads were still providing an excellent level of service — at least on their main lines. An all-Pullman *Broadway Limited* still linked New York and Philadelphia with Chicago, and in the eyes of many of its riders service on board was actually getting better. The well-patronized New York–Florida trains offered by competitors Atlantic Coast Line and Seaboard Air Line seemed immune to the troubles other routes suffered.

In the West, the beautiful *California Zephyr* with its five dome cars, remodeled Cable Car lounge, and multiple Pullman sleepers, still offered riders a trip over the most scenic route between Chicago and the Bay Area. The *Empire Builder* and *North Coast Limited* still ran intact from Chicago to Seattle, and the *Denver Zephyr* was completely reequipped in 1956.

But there were also troubling signs of retrenchment, even on the best trains. The Santa Fe's glamorous, all-Pullman *Super Chief* was combined with the all-coach *El Capitan* in early 1958. The same year, B&O's beloved all-Pullman *Capitol Limited* was combined with the all-coach *Columbian*. New York Central downgraded the all-Pullman *20th Century Limited* in 1958 by adding coaches and cutting some services. In 1961 the Milwaukee Road terminated the beautiful *Olympian Hiawatha*. And the outstanding Union Pacific fleet of "City" streamliners was also going through a series of consolidations for cost savings. That effort would eventually culminate later in the decade with the operation one enormous train on eastern portions of the route dubbed the "City of Everywhere."

There were troubling signs of retrenchment, even on the best trains.

Some smaller passenger carriers were getting out of the business altogether. By 1962 the list of freight-only roads included such notables as Cotton Belt (which quit carrying passengers in 1959), Maine Central (1960), Bangor & Aroostook (1961), and Lehigh Valley (1961).

These changes underscored one of the principal risks of the interconnected network of passenger trains. The routes of many trains included two, three, or more separate railroads. And each of those railroads had different financial health and attitudes about operating passenger service in the increasingly tough times.

An example of this was the *Texas Special*, operated by the Frisco and the Katy between St. Louis and points in Texas. One of the most beautiful trains of the postwar era, in 1956 the *Special* still carried three through sleeping cars from connections at St. Louis: one from Chicago off the Wabash, one from New York from the Pennsy, and one from Washington via the B&O.

The financially shaky Katy deferred maintenance of its equipment and track in the late 1950s, resulting in horrific timekeeping into St. Louis — and regular missed connections to the East and Chicago. As a result, first, the through cars were terminated, then in 1959, Frisco dropped out of operating the *Texas Special* altogether, and Katy rerouted it to Kansas City. The traffic lost at hubs like St. Louis and Chicago had a negative effect on other trains that served the major Midwest transfer points. The loss of the *Texas Special*'s connecting passengers, for example, also hurt the B&O and the PRR.

As ridership declined, mail revenue became more important. The withdrawal of most of mail in 1967, three years after this scene in Chicago, was the death knell for many trains. John Gruber

Santa Fe 23, formerly the *Grand Canyon*, a full-service train with sections on two routes, is a coach-only shadow as it heads west from Chillicothe, Ill., in February 1968. J. David Ingles

A BELOVED TRAIN FALLS

Probably the most poignant example of this trend was the most beloved train in the country — the *California Zephyr*. Its troubles seemed to sum up the difficulties of operating passenger trains by the 1960s, but it also helped the country recognize what it was losing. Operated by the still passenger-friendly Burlington Route, the *CZ* also depended on two smaller carriers, the Rio Grande and the Western Pacific, to reach its western terminal at Oakland. Of these, the weakest link was the WP.

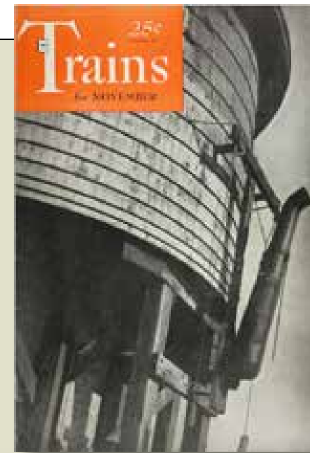
Despite being regularly sold out in the summer season and running three-quarters full for the entire year in 1965, the *CZ* was viewed by the Western Pacific as a significant financial liability. WP first filed with the ICC for discontinuance of the train in 1966, citing losses of $859,000 in avoidable costs. The age of the train's equipment and the need to invest millions to replace it from private funds also was cited by the railroad as a reason it wanted out of the passenger business. (This equipment-replacement argument would be used by many other railroads seeking permission to drop trains.) In response to the WP, the ICC initially referred to the *CZ* as a "unique national asset" and rejected the railroad's request.

The *Zephyr*'s demise in March 1970 was much lamented. But it also focused the public's attention on the fact that trains were being lost because they were managed by private, sometime struggling companies that put profit at the top of their list rather than the public good. Underscoring that concern, three months later the nation's largest passenger carrier, Penn Central, collapsed into bankruptcy. PC's failure raised the real threat of the potential loss of all intercity passenger service in the Northeast Corridor, and was an impetus for the creation of a national, publicly funded passenger-rail system.

By the late 1960s, as contrails from DC9s and 727s criss-crossed the sky, the country found itself torn apart by the Vietnam War, racial inequality, and a host of other issues more important than the plight of the passenger train. Against this backdrop, the last surviving private passenger trains ran out their final miles. The final straw for most of them came in fall 1967 when the U.S. Post Office announced that it would be eliminating the sorting of mail en route aboard most passenger trains. Railway Post Office cars in 162 trains on 22 carriers were eliminated. The railroads lost $17.1 million in postal revenue. In some cases mail contracts had been virtually the only reason a train still ran.

As the marker lights of last runs disappeared in the distance, the best work to save the passenger train was now being done in the halls of Congress, not in a railroad office. ■

JOE WELSH, a frequent contributor to Classic Trains, *is the author of numerous books and articles about passenger trains.*



Archive Treasures

Trains + photography=

IN 1940, A NEW MAGAZINE EMERGED AS A FORUM FOR RAILFANS WHO TOOK PICTURES OF TRAINS

BY SCOTT LOTHES
Photos from the Center for Railroad Photograhy & Art collection

From their inception, railroads attracted devotees. In England, the cradle of railroading, railway aficionados started banding together to form organizations in the 19th century. By the 20th century, American railfans were taking similar steps. The Railway & Locomotive Historical Society (R&LHS) was chartered in 1921, and other groups followed in the 1930s, including the Railroad Enthusiasts, Inc.; Electric Railroaders Association; National Railway Historical Society; and the Railroadians of America.

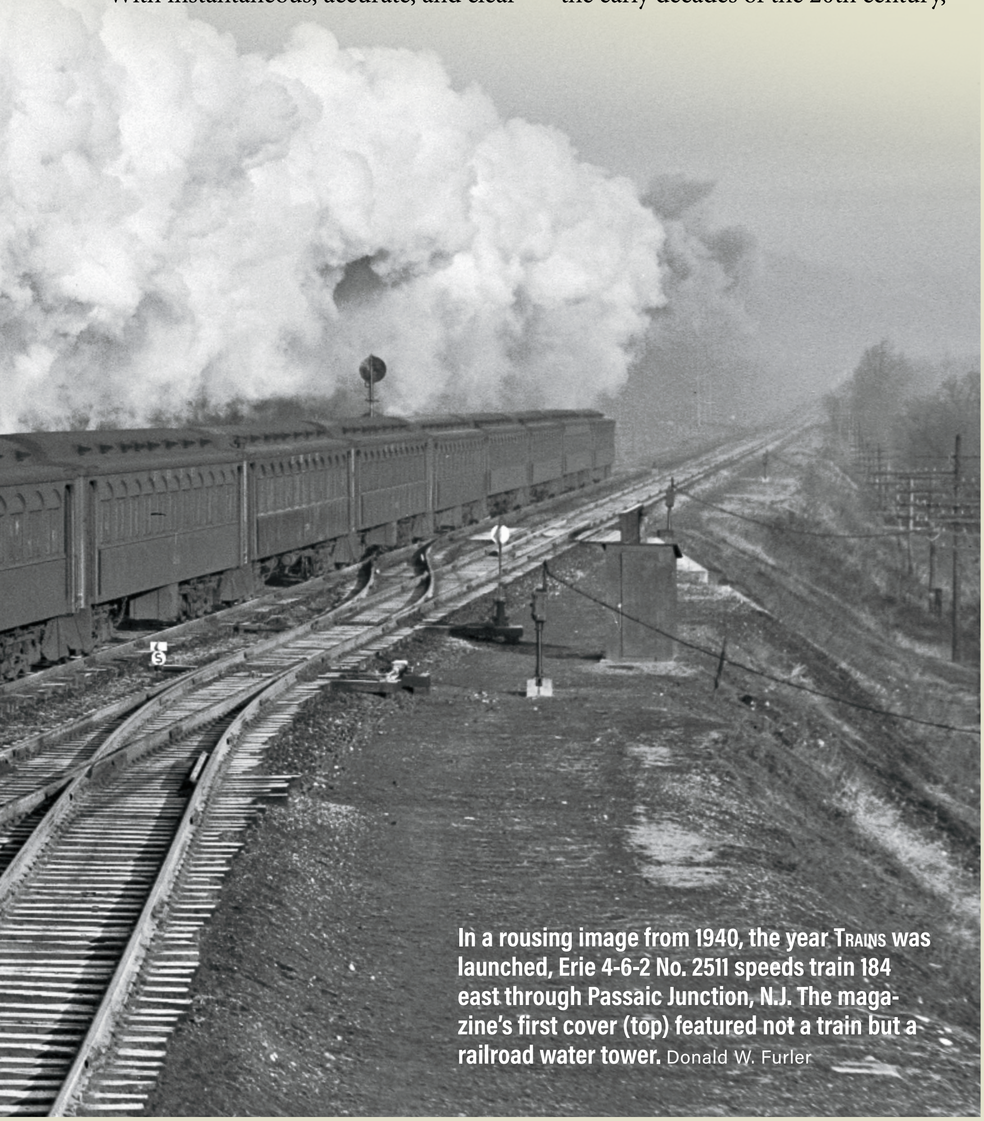
Railroad photography grew alongside these efforts. Railroads touch all aspects of the senses, especially sight. Indeed, photography itself, mixing the visual arts with the mechanical device of the camera, came of age at trackside. With instantaneous, accurate, and clear recording of any subject before them, photographic cameras were perfectly suited to depict railroads and the faster-paced way of life they fostered.

Imagery is so much a part of our lives today that we take its presence for granted, but that was not always the case. With just a few taps on a keyboard or touchscreen, we can pull up thousands of images on any subject we can imagine. From this perspective, it can be difficult to appreciate the challenges members of the railfan community once faced when it came to finding railroad imagery, as well as finding one another. Before Google, Facebook, Flickr, Instagram, and so many other platforms connected us and put literally billions of photographs at our fingertips, we relied almost exclusively on print media. In the early decades of the 20th century, there were few print media platforms for the railroad community.

As author Jeff Brouws noted in his introduction to *A Passion for Trains: The Railroad Photography of Richard Steinheimer* (W. W. Norton, 2004), those platforms primarily were two trade journals, *Railway and Locomotive Engineering* and *Locomotive Engineer's Journal*, plus the pulp publication *Railroad Man Stories*, which later became *Railroad* magazine. While each one presented photographs, photography was not the primary focus for any of them. The rise in amateur photography in the early 20th century, catalyzed by better and cheaper cameras and film, had led many rail enthusiasts to try image-making. Yet sharing their work, and seeing others' work, took place almost exclusively on the local level, through club meetings and informal basement gatherings, if it took place at all. The renowned photographer J. Parker Lamb, for example, a native of Meridian, Miss., did not meet another railfan until he was away at college.

Lamb had grown up reading Trains magazine, and it helped him develop a keen eye for railroad photography. His experience was not unique. Pull any recent monograph of railroad photography off your shelf, skim the introductory essay, and you will almost certainly find Trains cited (usually frequently) among the photographer's earliest and most significant influences. Trains was there for Lamb and Steinheimer, as it was for Jim Shaughnessy, Wallace Abbey, O. Winston Link, David Plowden, and so many others. If you wanted to photograph trains and grew up anytime after 1940, you turned first to Trains, and then you kept turning back to it. Decades before terms like "social media" and "influencer" entered our lexicon, Trains was both for the rail enthusiast community.

Albert C. "Al" Kalmbach launched Trains in 1940. It was a natural extension of his already successful Model Railroader magazine, which he founded in 1934. Kalmbach perceived a need for Trains, evidenced by MR's rising circulation numbers as well as the recent formation of several railfan groups. Kalmbach had also seen the success of *High Iron*, Lucius Beebe's first railroad book. Published in 1938, it "won a new audience for railroad photogra-



In a rousing image from 1940, the year Trains was launched, Erie 4-6-2 No. 2511 speeds train 184 east through Passaic Junction, N.J. The magazine's first cover (top) featured not a train but a railroad water tower. Donald W. Furler

A group portrait during a September 1980 photo charter on the Cumbres & Toltec Scenic summarizes the enduring importance of photography to rail enthusiasts. Victor Hand

phy," according to Beebe biographer John Gruber.

Kalmbach served as editor of Trains for its first eight years and prioritized photography from the start. Prophetically, the first article in the first issue, dated November 1940, was "Railroad Photography," by Beebe. Kalmbach made the December 1941 issue, just the 14th for the magazine, a "Photo-Special," advertised on the cover in big type with 16 interior pages and the rear cover devoted exclusively to the subject of railroad photography. In his editorial, Kalmbach proudly noted, "The best of railroad photographs appear every month in Trains — 50, 60, or more of them. This magazine has made every effort not only to choose the pictures which best portray the American railroad scene, but to reproduce them effectively."

Readers took note. One of them was Donald W. Furler, a talented New Jersey photographer whose crisp locomotive pictures and exquisite train action shots helped Kalmbach establish his high photographic standards in those early years. In his introductory letter to the editors, Furler called Trains "the answer to the long desired 'railfan' publication of better quality; a strictly factual and photographic magazine, employing better illustrations and the desirable 'slick-paper.'"

Furler and his contemporaries sent their best photographs to Trains' Milwaukee office and were delighted to see their work in print. Getting published in Trains soon became a friendly but competitive game of one-upmanship, where photographers across the country brought out the best in each other — and ultimately in themselves — to land a coveted spot in "the" magazine.

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In addition to providing the stadium and spectators for this new sport, Trains also helped the photographers and readers find one another. Credit lines in early issues included names as well as mailing addresses, a practice Kalmbach had adopted from *Railroad* and its devoted community of readers and traders of engine pictures. By doing so, Kalmbach ensured that correspondence flowed not only in and out of his Milwaukee hub, but also independently and organically in an interconnected web that grew with Trains' expanding circulation.

Most of the recent railroad photography monographs cite David P. Morgan, Trains' legendary editor who served from 1953 to 1987, as photographers' primary muse at Trains. Rightly so, for Morgan championed photography in general, and creative photography in particular, as he recreated the magazine after the steam era ended, raising it Phoenix-like from the dumped ashes of the locomotives that had been emblematic of railroading. Yet Kalmbach and his staff deserve credit, too. They built the magazine that Morgan led with so much skill, and, as Furler and others noted, they had already set high bars for both image selection and reproduction.

From the very first issue, Kalmbach established dynamic tension between the title of his publication, Trains, and the subjects featured in its photographs. The cover of that first November 1940 issue presents not a locomotive, but a water tower — cropped tightly and printed at a rakish angle for greater graphic effect. Kalmbach knew his readers' first loves were the trains themselves, but he also understood that nearly every facet and detail of railroading could be interesting, if presented in the right way.

With his choice of that photograph for the debut cover, and in so many later editorial choices, Kalmbach and associate editor Linn H. Westcott established their publication's broad coverage on the subject of railroading. In doing so, they created not only a better publication; they crystalized the nation's railfan community and sowed the seeds for a diverse and fascinating crop of contributions, whose bountiful harvest shows no signs of abating. T

SCOTT LOTHES is president and executive director of the Center for Railroad Photography & Art in Madison, Wis. Classic Trains' "Archive Treasures" series features images from the Center's growing collection.

Strike of the century

A WIDESPREAD JOB ACTION LEFT A POSITIVE LEGACY

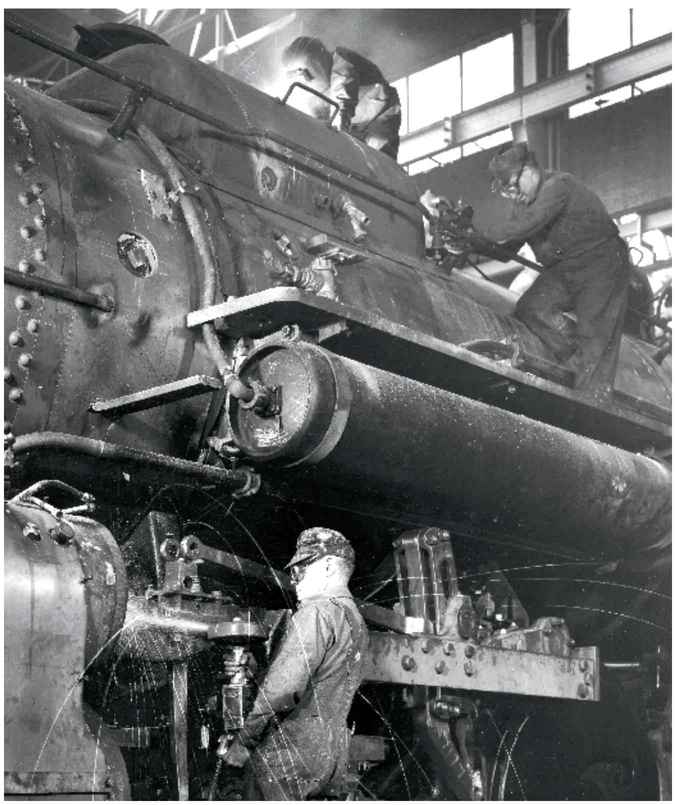
BY H. ROGER GRANT

Major railroad labor disputes haunted the nation during the latter part of the 19th century, highlighted by the "Great Railroad Strike," which spread from Maryland to California in 1877 and the Pullman Strike 17 years later. Both of these bitter conflicts led to multiple deaths and costly physical destruction. The Shopmen's Strike of 1922–23, however, was less violent and destructive, but it did become the worst railroad strike of the 20th century and triggered important management-worker reforms.

Rail labor had made substantial gains during the century's early years. As progressive-era reform matured, though, a growing number of politicians, including many associated with the Woodrow Wilson administration, believed that trade unionism and collective bargaining reduced class conflict. Not only did reformers in 1916 back the Adamson Act — which gave operating personnel and telegraphers an 8-hour day — they included in the U.S. Railroad Administration of 1917–20 the Board of Railroad Wages and Working Conditions, which granted additional labor protections.

Once World War I was over and peace returned, shopmen collectively sought to continue government operations, backing labor's Plumb Plan of 1919 for nationalization. Instead, Congress passed the Transportation Act of 1920, which returned rail carriers to their owners. The Railroad Labor Board (RLB) became part of this legislation. Shopmen worried about this, and soon their fears were realized. In June 1921 the RLB recommended a wage cut that averaged 12.5 percent. It further angered shopmen by endorsing the outsourcing of work, reducing overtime pay, and sanctioning piecework payments rather than the more ruminative salaries.

Tensions mounted. Ultimately on July 1, 1922, the Railway Employees' Department (RED), a division of the American Federation of Labor, went on strike. More than 400,000 shopmen participated. They were optimistic, believing their stoppage would "seriously hamper railroad operations." That did not happen. The carriers responded immediately, launching company unions, hiring "scabs," and pressuring shopmen to remain on the job with the threat of a loss of seniority and other benefits. Moreover, the operating brotherhoods showed limited support.



Men work on an Illinois Central locomotive at the road's backshop in Paducah, Ky., sometime during the 1940s. Hedrich-Blessing Studio

By December, frustrated hardcore strikers increasingly turned to intimation of non-supporters and participated in modest but widespread vandalism.

By mid-1923 the multi-railroad strikes mostly had ended, largely with a whimper. The anti-union stand by the industry and aggressive actions of U.S. Attorney General Harry Daugherty, supported by federal judge James Wilkerson, doomed the strikers' cause. The dispute formally ended for most railroads in March 1924, yet the RED did not call off its strike against an intensely anti-labor Pennsylvania Railroad until September 1928.

Although ill feelings lingered for years among defeated shopmen toward companies and fellow railroaders who failed to support them, their strike created positive legacies. The key accomplishment was the Railway Labor Act of 1926, which established an important precedent for union recognition by abolishing the RLB and instituting collective bargaining machinery with management. There were loopholes, but amendments in 1933 and '34 by New Deal lawmakers plugged most of those. Notably, company unionism and the use of "yellow dog" contracts, which prohibited workers from joining unions as a condition of employment, were outlawed. The Wagner Act of 1935 further strengthened workers' rights in non-agricultural sectors, including railroads. While there would be other railroad strikes, never again would there be such a bitter industry-wide dispute.

14. 20/20 HINDSIGHT Warbonnet paint scheme

Colorful

BY KARL ZIMMERMANN

Many things about Santa Fe's brilliant and quintessentially famous logo and diesel paint scheme known as the "Warbonnet" are widely recognized. It was created (principally, though he did have collaborators) by Leland A. Knickerbocker for the Santa Fe's sleek E1A No. 2 and E1B 2A, Electro-Motive Corp. diesels delivered in 1937 to power the first streamlined *Super Chief*. A dramatic painting by Knickerbocker, a member of General Motors' "Art and Colours Section," dated February 17, 1937, almost exactly forecasts the look of the completed locomotive as it was delivered four months later. And his name and design were included in the design patent for the carbody shape.

The design took Santa Fe's long-standing round emblem and simply stretched it into an oval that fit gracefully over the E1's slanted nose, with SANTA FE blazoned across it in a moderne sans-serif typeface. On the locomotive's flanks was the traditional round herald, but with the stoic face of an Indian superimposed, his feathered headdress streaming backward, suggestive of speed. Knickerbocker hand-painted these on E1A No. 2, at the EMC plant in La Grange, Ill., though on the later E1s enameled medallions were affixed instead. Knickerbocker himself described his stunning red, yellow, silver, and black paint scheme as representing "the profile of an Indian Headdress and the trailing feathers of a warbonnet." Thus, the Warbonnet idea was there from the beginning.

No small factor in the burgeoning fame of the Warbonnet was its adoption by toy and model train manufacturers, beginning with Lionel in 1948. The company released back-to-back Electro-Motive F3As. These were a radical departure for Lionel; until then, its motive power consisted of steam locomotives and a likewise dark-hued Pennsylvania Railroad GG1 electric. Feel-

classic

SANTA FE'S WARBONNET IS AN INDUSTRY ICON

The westbound *Fast Mail* passes milepost 54 on Cajon Pass in 1963 with an A-B-B-A-A set of Warbonnet F units. Tom Gildersleeve

SD75M No. 233 leads a westbound intermodal at Craig, Kans., in March 1995. Chris Guss

ing that it was venturing into uncharted territory, Lionel brought Santa Fe, New York Central, and EMD into a financial partnership to build the F3As, offered only in the Warbonnet and Central's "Lightning Stripe" scheme. The partners banked on public relations, which they certainly saw in spades. Two years later, rival American Flyer released Warbonnet Alco PAs. Today, thousands upon thousands of Warbonnet locomotives roam model railroads of all scales. From Road Runner cartoons to poster graphics, the image has become a staple of popular culture.

Arguably the most famous locomotive paint scheme ever created, and the longest-lasting, the Warbonnet was applied to hundreds of Santa Fe first-generation cab units. When the pair of box-cabs that powered the 1936 heavyweight precursor of the 1937 *Super Chief* were restyled, they got the scheme, as did Budd RDCs and even a motor car and a tugboat. In the late 1960s, passenger-loyal Santa Fe ordered a number of dual-service diesels, FP45s from EMD and U28CGs and U30CGs from General Electric, in Warbonnet dress.

Even that wasn't the end, as in 1990 the livery was resurrected for Santa Fe's "Super Fleet" freight units, which included rebuilt FP45s and new GP60Ms, GP60Bs, and SD75Ms from EMD and B40-8Ws and C40-8Ws from GE. By the time BNSF retired the scheme, the 1990s Warbonnets outnumbered the originals.

Great star-power never dies, it seems. ■

KARL ZIMMERMANN is the author of Santa Fe Streamliners: The Chiefs and Their Tribesmen. *This is his 21st byline in a* Classic Trains *publication.*

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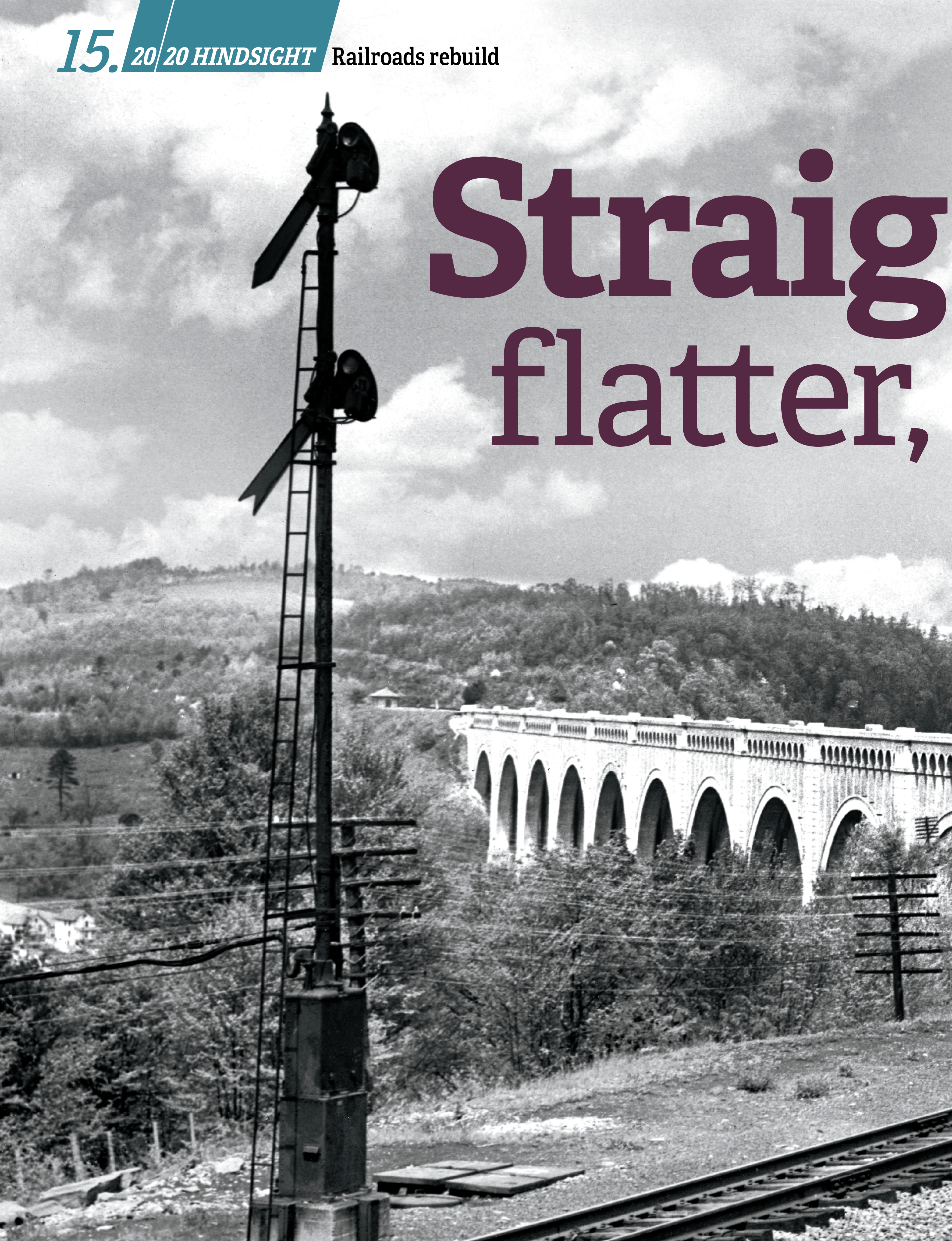
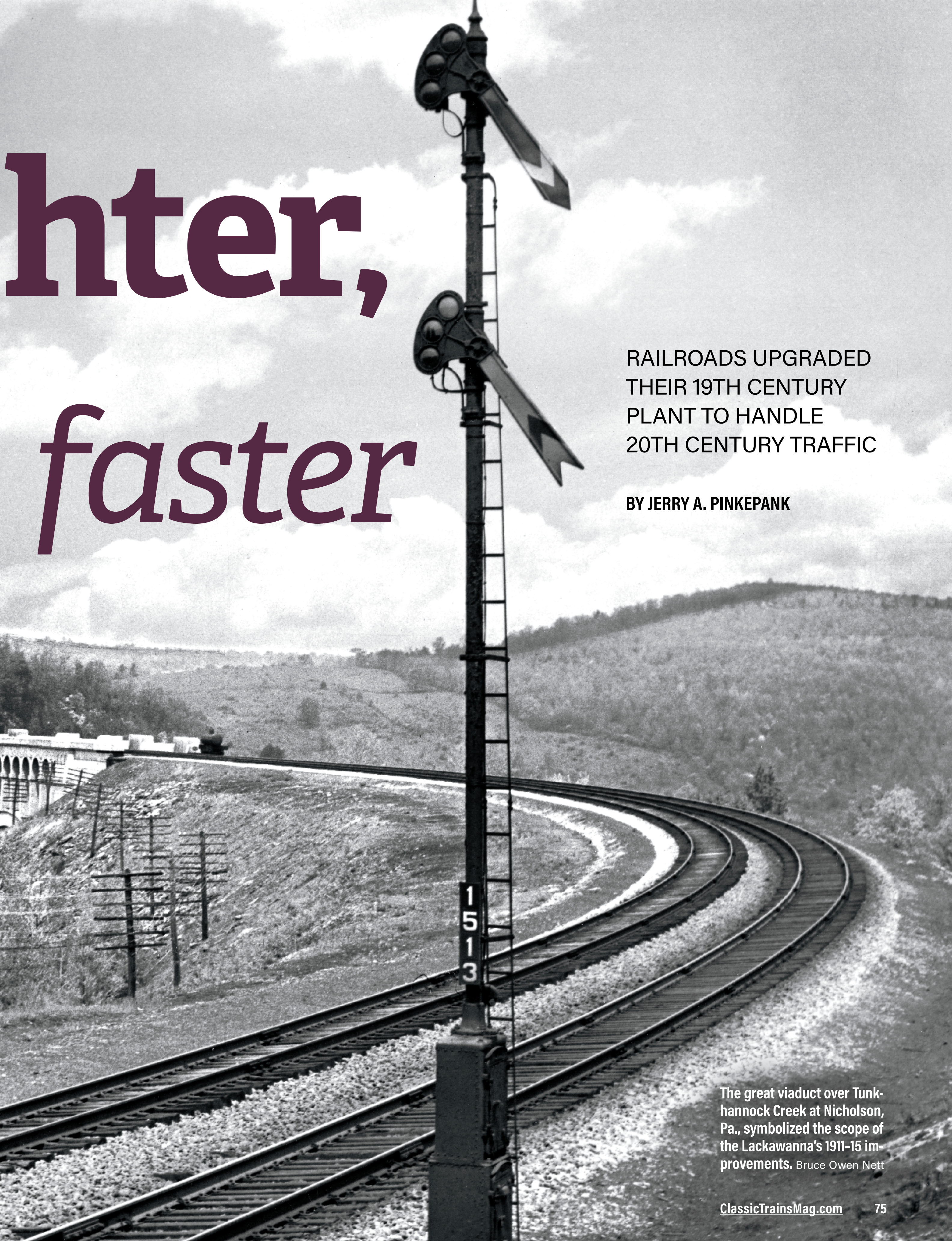


hter, *faster*

RAILROADS UPGRADED THEIR 19TH CENTURY PLANT TO HANDLE 20TH CENTURY TRAFFIC

BY JERRY A. PINKEPANK



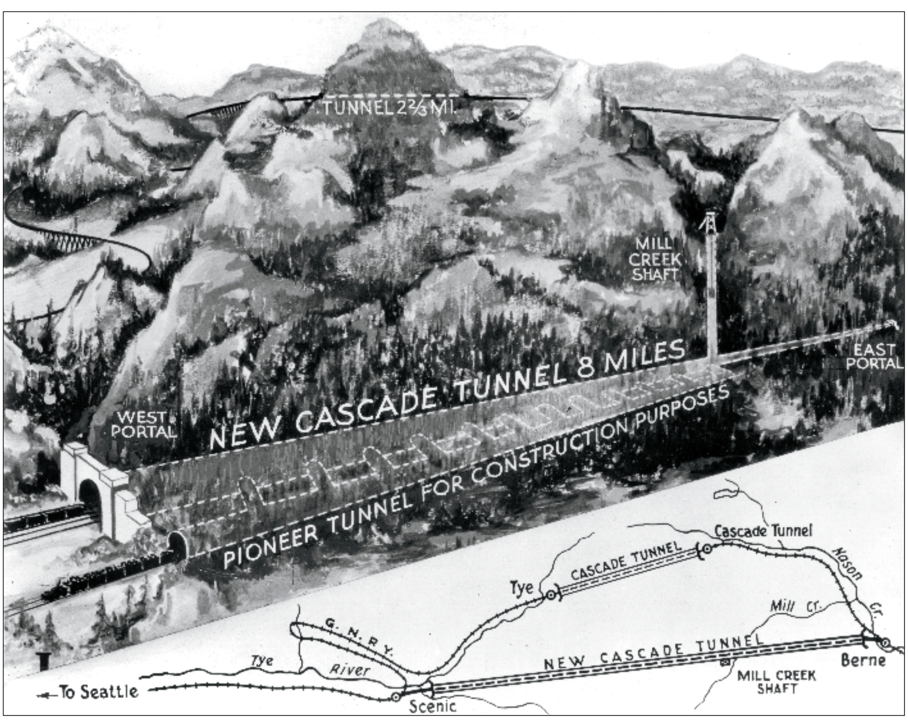
The great viaduct over Tunkhannock Creek at Nicholson, Pa., symbolized the scope of the Lackawanna's 1911–15 improvements. Bruce Owen Nett

When North American railroads were built in the 19th century, speed and economy of construction took precedence over engineering refinement — it was necessary to get revenue flowing to pay the bills. This was in contrast to the situation in Britain, where transportation markets in the form of population, industrial, port, and agricultural centers were well established and the terrain less challenging, so that railroads were built in a highly finished fashion from the outset. In North America, railroads were opening new lands to settlement, and in the far West this was often being encouraged by land grants that had deadlines for completion that demanded hasty construction.

Engineering technology before the 1870s, when the steam shovel became prominent, was primitive. When cuts and fills had to be accomplished by men with shovels and mules pulling dump carts, it was necessary to accept a rolling profile and lots of curves around obstacles rather than cut through them. Tunneling with hand drills and black powder was generally too slow to accept, the more so if the material being tunneled was loose and needed timber framing to keep it in place.

After the initial haste of construction, as traffic built up with population and economic growth, and as railroad technology improved with steel replacing iron in rail and bridges, and air brakes allowing longer trains with bigger locomotives, the incentives to improve lines grew greater, and the financial ability to deal with projects improved. In the first part of the 20th century, the process of replacing timber trestles with earthen fill or steel bridges, and of line changes to reduce grades and curvature, was well under way. Some of these efforts were of major proportions, as in the following prominent examples.

Southern Pacific's 103-mile Lucin Cut-off opened in 1904 to replace the 1869 line via Promontory Summit, Utah. It included 27 miles of fill and trestle across the Great Salt Lake. SP



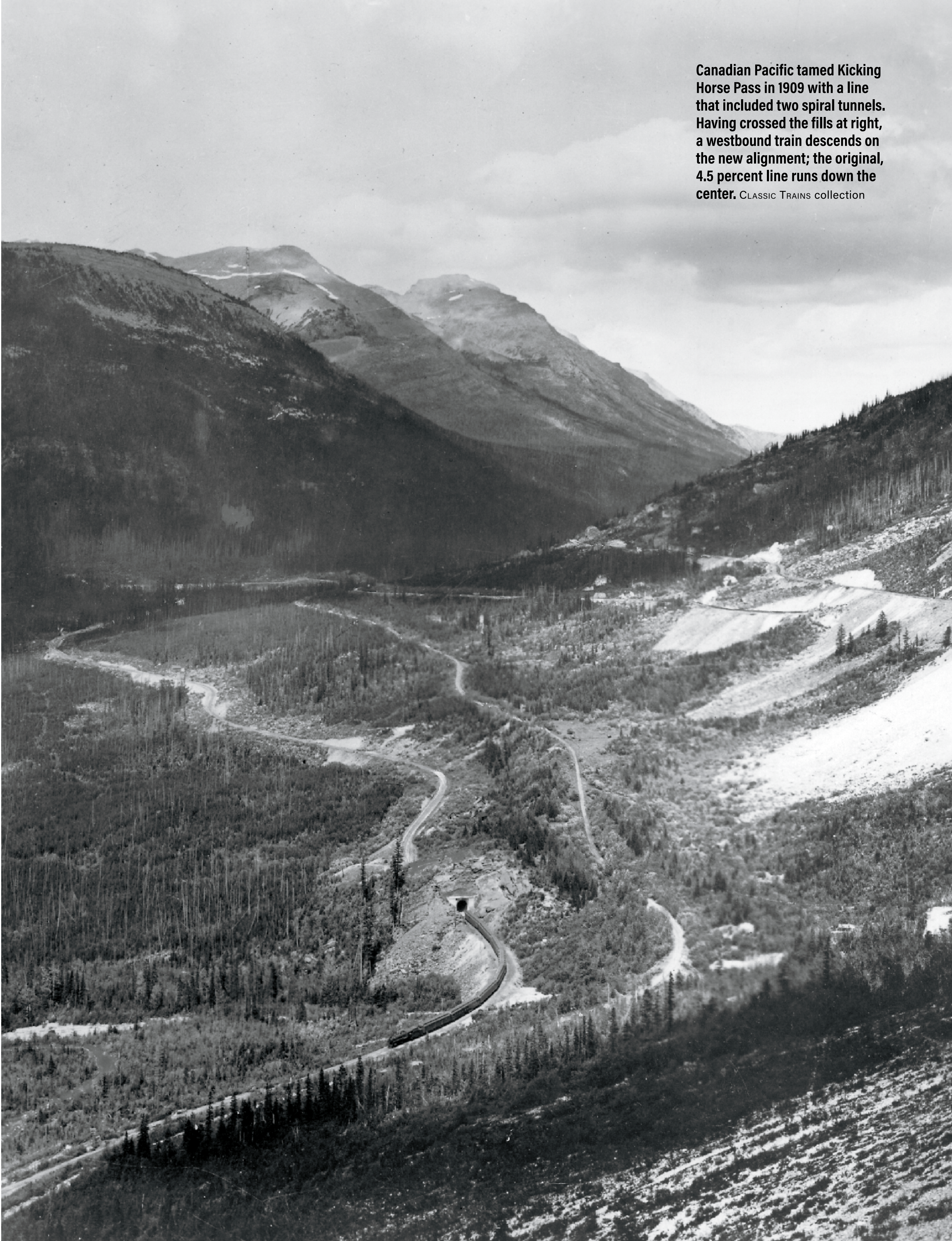
To surmount the Cascade Range, Great Northern used switchbacks, then a 2.62-mile tunnel, and finally in 1929 a 7.79-mile bore that is still today the continent's longest railroad tunnel. GN

1900–1929
GREAT NORTHERN'S IMPROVEMENTS IN WASHINGTON STATE

When the Great Northern was pushed into Seattle in 1892–93, switchbacks on 4 percent grades on the west slope and 3.5 percent on the east were used to cross the Cascade Mountains in Stevens Pass, and the railroad from Everett to Seattle was literally laid on the beach of Puget Sound. In Seattle the GN had entered on lengthy waterfront trestles and had settled for street trackage in Railroad Avenue (now Alaskan Way) along the waterfront.

The first task was to eliminate the switchbacks, and this was accomplished by drilling the 2.62-mile first Cascade Tunnel, opened in December 1900. It reduced the ruling grades on each side of the summit to 2.2 percent, and a 5-mile electrification in 1909 dealt with smoke, but avalanches remained a major hazard. The only acceptable solution was to build a line change that included the 7.79-mile "new" Cascade Tunnel, the longest in North America. The line change and tunnel opened in January 1929.

Between 1900 and 1929 the mileage between Wenatchee and Skykomish was shortened by 18 miles and included 72.9 miles of 11,000-volt single-phase A.C. electrification between Wenatchee and Skykomish. Between Everett and Seattle, a 2,440-foot tunnel under downtown Everett was completed in 1901, saving 6.1 miles compared to the old line around the north side of town. Then came the 5,141-foot tunnel under downtown Seattle, started in 1902 and completed in 1905, which got the main line off the



Canadian Pacific tamed Kicking Horse Pass in 1909 with a line that included two spiral tunnels. Having crossed the fills at right, a westbound train descends on the new alignment; the original, 4.5 percent line runs down the center. Classic Trains collection

Just above Cajon station in the 1940s, a brakeman rides the top of a car in a train descending Cajon Pass's original line as a passenger train climbs the gentler 1913 alignment. Herb Sullivan

waterfront, capped by the construction at the south portal of the tunnel of the magnificent King Street Station (opened 1906) serving Northern Pacific and GN.

The hardest part was double-tracking from Everett to Seattle, which included replacement during 1906–11 of the storm-vulnerable original timber cribbing on the beach with 18 miles of stone-protected grade including 11.4 miles of seawall. In Seattle, there was a large amount of trestlework to be filled in north of downtown. GN filled the trestles during 1911–16 with dredging spoils from the construction of the Lake Washington Ship Canal.

The canal project also led in 1914 to replacing the original curving timber trestle across the head of Salmon Bay with the 1,145-foot Bridge Four, with its 200-foot, two-track bascule span and steel approach spans, allowing double track to be complete from Seattle to Everett.

1902-1904
SOUTHERN PACIFIC'S LUCIN CUTOFF

During the 1868–69 rush to complete the first transcontinental railroad, Union Pacific management thought that their railroad would meet the Central Pacific somewhere west of the Great Salt Lake, and the UP's survey intended a trestle crossing. But the lake's water level fluctuates, and in 1868 was higher than the Mormon settlers had yet experienced, so the idea was set aside and the two railroads met north of the lake at Promontory on a line with three summits having ruling grades of 1.35, 1.25, and 1.3 percent eastbound and 1.7, 1.26, and 1.4 percent westbound. Southern Pacific operated the line west of Ogden, Utah.

By 1900 the lake level had fallen 15 feet, and the trestle and earth fill approaches became practical. SP began work on a lake crossing in 1902. The crossing represented 27 miles out of the total 103-mile Lucin Cutoff. The new route was 44.8 miles shorter with ruling grades of just .03 eastbound and .04 westbound. A causeway replaced the trestles in 1959.

1904-1908
ERIE RAILROAD'S GRAHAM LINE

The Erie built a 30.2-mile low-grade freight line in southeast New York state, leaving the original 1840s alignment via Middletown for passenger trains. The Graham Line was made 7 miles longer than the old line to reduce the grade, avoiding 1.25 percent grades and three helper districts in favor of grades no greater than .02 percent eastward and .06

percent westward. Conrail abandoned the old line in 1984, and the Graham Line now handles mostly Metro-North commuter trains. Its most famous feature is the 3,200-foot-long, 193-foot-high Moodna Viaduct near Salisbury Mills.

1909
CANADIAN PACIFIC'S SPIRAL TUNNELS

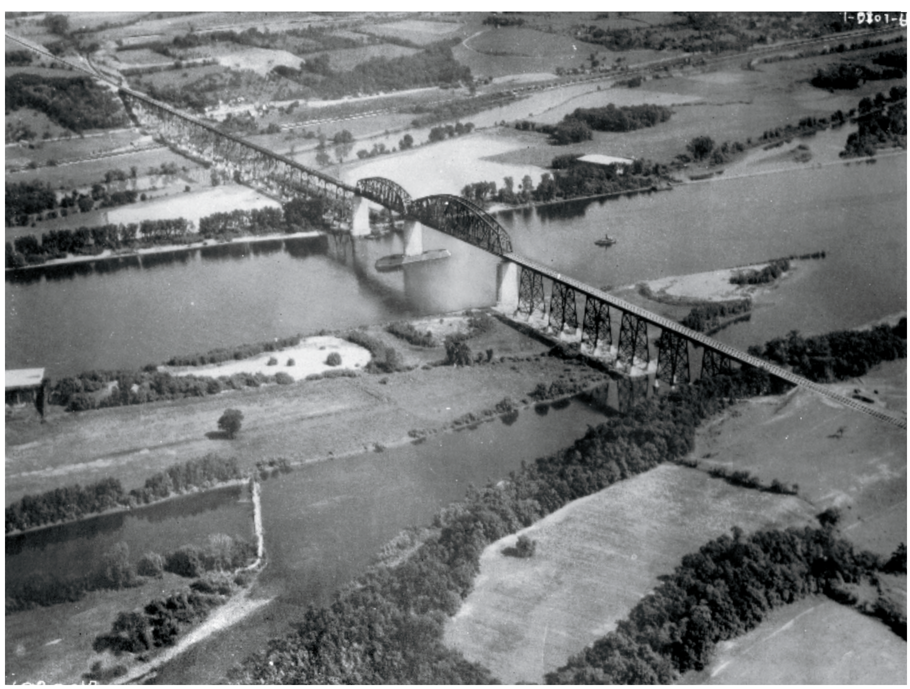
In 1884 Canadian Pacific used the expedient of a 4.5 percent ruling grade to drop from the summit of Kicking Horse Pass to Field, B.C. The geography did not provide the side canyons required for the usual method of building horseshoe curves to lengthen the line for grade reduction, and the 10-mile tunnel that would have been needed to lower the summit of the line was rejected in favor of, in effect, creating the side canyons nature had not provided by putting the necessary grade-lessening curves inside two curved tunnels. This lengthened the line by 8 miles, which allowed reduction of the ruling grade to 2.2 percent.

1911-1915
LACKAWANNA'S NEW JERSEY AND NICHOLSON CUTOFFS

The Lackawanna's original main line across western New Jersey dipped far to the south, the result of its being built by two predecessors that intersected as they pushed toward different destinations. Flush with profits from anthracite coal traffic, the road built a new, heavily engineered line, which it opened in December 1911. The original alignment had been a 39.6-mile route with a ruling grade of 1.14 percent; the new cutoff was 28.5 miles with a ruling grade of .55 percent.

In Pennsylvania, the problem was 43 miles of hill-and-dale railroad just west of Scranton, which included three helper districts against eastbound trains and one against westbounds. The new Nicholson Cutoff opened in November 1915. Unlike the New Jersey Cutoff, this line closely paralleled the old (1851) one. It eliminated the helper districts by jumping across valleys, including two spectacular concrete arch viaducts, and then benching along the hillsides. The 39.6-mile new line reduced the ruling westbound grade from .52 to .24 percent, and the ruling eastbound grade from 1.23 to .68 percent. The most dramatic feature of the line is the viaduct at Nicholson, reputed to be the world's largest concrete arch bridge, 2,375 feet long and 240 feet above Tunkhannock Creek. The similar nearby Martin's Creek viaduct is 1,600 feet long and 150 feet high.

Brand-new Rio Grande GP30s meet at the east portal of the 1928 Moffat Tunnel, which, with the 1934 Dotsero Cutoff, gave Denver a connecting rail route to the west. Bruce R. Meyer



Centerpiece of the New York Central's 1924 Castleton Cutoff south of Albany, N.Y., was the big double-track bridge over the Hudson River, named for NYC President Alfred H. Smith. NYC

1913
SANTA FE-UNION PACIFIC'S CAJON PASS SECOND MAIN

The Santa Fe's original line entering the Los Angeles basin was completed in 1885. The climb begins right out San Bernardino and has a ruling grade of 2.2 percent until Cajon station, 16 miles east of San Bernardino, where the 1913 second main diverges. The original line for the remaining 6 miles of climb, to Summit station, has a ruling grade of 3.0 percent. The 1913 second main on its separate alignment is a mile and a half longer and has a ruling grade of 2.2 percent. Union Pacific predecessor San Pedro, Los Angeles & Salt Lake acquired trackage rights on Santa Fe in 1905 and so participated in the decision to build the new line and shared in the expense. Since 1913 there have been further revisions to the lines through the pass, including a significant change at Summit in 1972.

1924
NEW YORK CENTRAL'S CASTLETON CUTOFF AND SELKIRK YARD

New York Central's situation at Albany, N.Y., had greatly lagged the development of the railroad. All traffic needing to cross the Hudson River, passenger and freight, was being crammed onto two low-level swing bridges, and in the navigation season these might be opened 40 times a day. Also, there was a need to integrate NYC's freight traffic on both sides of the river with that of subsidiary Boston & Albany, and there was no room to expand West Albany Yard for that purpose. The solution was to build a major hump yard at Selkirk, on the existing line up the west shore of the Hudson where it cut across toward the NYC main to Buffalo. The yard, with a new high-level bridge, would serve the freight traffic of all three routes.

A major advantage of the project would be to reduce grades on all three routes. Westbound traffic off the Hudson Division and the B&A was faced with West Albany Hill, which has a short section of 1.54 percent grade against westbounds that required pushers even for passenger trains. Eighty-car freights arriving opposite Albany at Rensselaer were broken into 40-car trains, and pushers shoved them to West Albany Yard. With the new bridge and new Selkirk Yard, they would be kept out of Rensselaer and Albany/West Albany altogether, and face only a .15 percent grade from the bridge to Selkirk, and a .56 grade from there to a connection with the Mohawk Division main line at Hoffmans, 26 miles west of Albany. Before the improvements, eastbound B&A freights leaving Rensselaer faced a 4-mile, .67-percent ruling grade; with the new bridge and yard, they would face only a .15 grade to the bridge and a .60 grade to the connection with the B&A at Post Road, 12 miles east of Albany. River Division traffic that had come up the west shore of the Hudson faced a less significant impediment, as the ruling grade to Hoffman's was just .53, but this also was reduced by a new connection with a .35 ruling grade against westbounds.

A new grade was introduced to bring the Hudson Division up to the level of the new bridge from the south. This was done with an 8.6-mile new line which began at a connection at Stuyvesant, 16.7 miles south of Rensselaer, with northbound and southbound lines having separate junctions to avoid crossovers. The southbound connection was bridged over the four-track main; NYC practice on four-track lines was to have most freights use the outside tracks. With this long approach, the grade was held to .35 percent.

The entire project involved 20 miles of new double-track railroad with the bridge over the Hudson being 5,254 feet, including a 600-foot through-truss span over the main navigation channel, 135 feet above high water. The project was opened in November 1924.

Driven by cities desiring to eliminate grade crossings, and by their own quest for efficiency, railroads did major grade separation work in the early 20th century. Chicago's Grand Crossing project, seen in 1912, eliminated dozens of street crossings and diamonds. John Gruber collection

In the 1890s and 1900s, the Pennsylvania built low-grade lines that separated freight and passenger traffic, followed by electrification in the 1920s and '30s. At Whitford, Pa., in the early '50s, a GG1 speeds the *Admiral* east beneath the Philadelphia & Thorndale freight line. David G. Knox

1914–1928
ATLANTIC COAST LINE'S PERRY CUTOFF

During the Florida Boom of the 1920s it became increasingly important to connect the Midwest with the growing Gulf Coast of Florida without forcing the traffic through Jacksonville on the Atlantic side. This became the West Coast Short Line Passenger Route project. Much of it was accomplished by 1914 with the construction of a 108-mile line from Dunnellon, Fla., to Perry. The project was completed in December 1928 when a 36-mile gap between Perry and Monticello was closed, shortening the Chicago–Tampa route by 73 miles.

1928–1934
DENVER & RIO GRANDE WESTERN/ DENVER & SALT LAKE'S MOFFAT TUNNEL AND DOTSERO CUTOFF

The Denver & Rio Grande Railroad in 1871–1889 avoided direct confrontation with the Front Range of the Rockies at Denver by building south to Pueblo and swinging northwest via the valley of the Arkansas River and over Tennessee Pass to join the valley of the Colorado River (which in Colorado is also called the Grand River). This is not a low-grade route — the ruling grade south from Denver to Pueblo is 1.55 percent and northbound is 1.45 percent, while on Tennessee Pass the east slope ruling grade is 1.42 percent and west slope ruling grade is 3.0.

Between 1903 and '07, the Denver, Northwestern & Pacific, led by David H. Moffat, built a line 50 miles northwest from Denver to what would eventually be the mouth of the Moffat Tunnel, and then built what was intended to be a temporary line over Rollins Pass, using horseshoe curves and grades of 4 percent. The intended permanent line then descended on a 1.0 percent grade to the Colorado River valley at Granby, 99 miles from Denver via the original line, 76 miles by the post-tunnel alignment, and continued along the Colorado River to a point 54 miles west of Granby, where it swung north and west, away from the river, on its intended way to Salt Lake City. The point where the DNW&P left the Colorado River was the nearest approach to the main line of the D&RG (by then the Denver & Rio Grande Western), where it had continued west from the Tennessee Pass route and had already reached Salt Lake City in 1883, so it had been evident from practically the beginning that instead of building its own line, the DNW&P (later called the Denver & Salt Lake) might partner with the D&RGW to reach Salt Lake City and, via D&RGW affiliate Western Pacific, connect to San Francisco.

The grading to connect the D&SL and D&RGW would be easy, simply continuing to follow the Colorado River for 38 miles. Surveys were done, but the connection, the Dotsero Cutoff, wasn't built until after the Moffat Tunnel was completed and the Great Depression had passed its worst. The 6.2-mile tunnel opened for rail service February 27, 1928. The Dotsero Cutoff opened for service June 15, 1934, with D&RGW trains using D&SL trackage rights. D&RGW acquired the D&SL in 1947 as part of the reorganization of both railroads out of their respective Depression-era bankruptcies.

The Moffat Tunnel and Dotsero Cutoff shortened the distance between Denver and Salt Lake City for the D&RGW by 175 miles while bypassing difficult Tennessee Pass, and made the Burlington-D&RGW-Western Pacific route competitive with the Chicago & North Western-Union Pacific-Southern Pacific between Chicago and the Bay Area. ■

Partnering with the enemy

RAILROADS REGAINED TRAFFIC LOST TO TRUCKS BY HAULING TRAILERS AND CONTAINERS

BY FRED W. FRAILEY

The first intermodal trains, 140 years ago, were a sight to behold. From farms adjacent to the Long Island Rail Road, produce wagons went to New York City atop flatcars; the horses that would pull them to markets rode on livestock cars in the same trains; and the farmers got there in chair cars. This lasted a decade, until 1894. And reaching back to Roman times, Smithsonian Institution historian Jack White has suggested that barrels were the first medium of containerization.

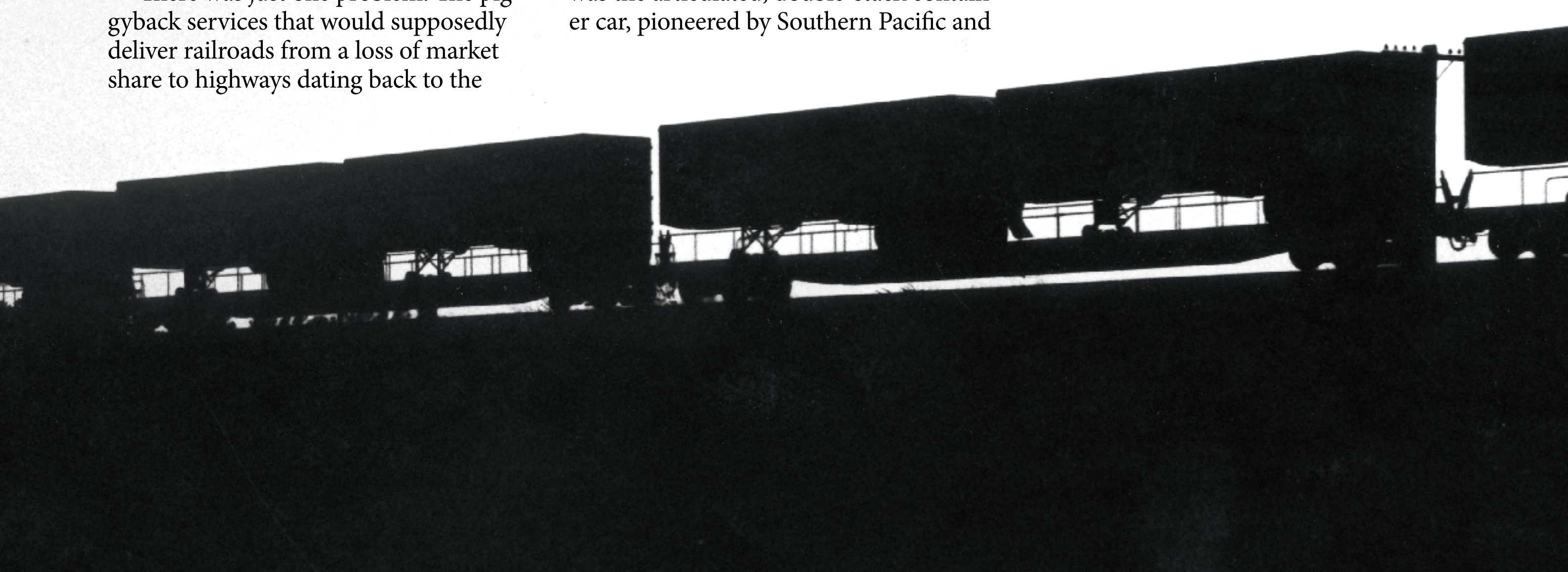
So now let's get practical. In the early 1930s, the cash-starved Chicago Great Western Railway introduced modern trailer-on-flatcar service (TOFC) between Chicago and Dubuque, Iowa. By the mid-1950s, piggyback service (another popular moniker) was The Next New Thing. I would see Kansas City Southern trains trundling through Sulphur Springs, Texas, in that decade with a couple of TOFC cars behind six F-unit locomotives at the head of 150 other freight cars. Every Class I road seemed to embrace the idea.

There was just one problem: The piggyback services that would supposedly deliver railroads from a loss of market share to highways dating back to the 1920s weren't making money. Penn Central entered bankruptcy in 1970 while running dozens of intermodal trains every day (note the next new "label," the one still with us). Revenue was low and costs were out of control, often because loading ramps were opened in too many low-volume locales. Thus began the quest for a mix of service and price acceptable to both truckers and railroaders.

United Parcel Service, willing to pay for reliable service, broke the ice, starting in the mid-1960s from the Northeast to Florida on Atlantic Coast Line and Florida East Coast Railway. Then UPS turned to New York–Chicago on Penn Central, switching successfully to Erie-Lackawanna when PC service went belly-up after its bankruptcy. In the mid-1970s, UPS used premium-priced, premium-service rail to join Chicago to the West Coast, primarily using Santa Fe and Union Pacific. Still, for other intermodal traffic, profits remained elusive.

Then came two developments that utterly changed the game. First, in 1981, was the articulated, double-stack container car, pioneered by Southern Pacific and American Car & Foundry. It effectively doubled the capacity of trains. Coupled with that was the trend toward moving U.S. manufacturing to Asia. Now instead of trucks moving manufactured goods relatively short distances, those goods arrived at West Coast ports by the boatload. Unless consumed on the West Coast, those goods needed to go 1,000 to 3,000 miles further, and for such distances rail had a distinct advantage. Thus was born the double-stack container train. By the late 1980s, dozens of such trains left Pacific Coast ports weekly.

The acknowledged leader in the Asia-America container trade was American Presidents Line, a steamship company which asked both Santa Fe and SP for rate concessions in return for a cascade of new business. They refused, not wanting to undercut their other steamship customers. But UP signed on and quickly became the leading double-stack carrier. Not only that, but APL began selling westbound service to prevent its containers from returning to the West Coast



Intermodal took a great leap upward with the double-stacking of containers in the early '80s. First employed for import traffic, the concept spread to domestic freight. Matt Van Hattem

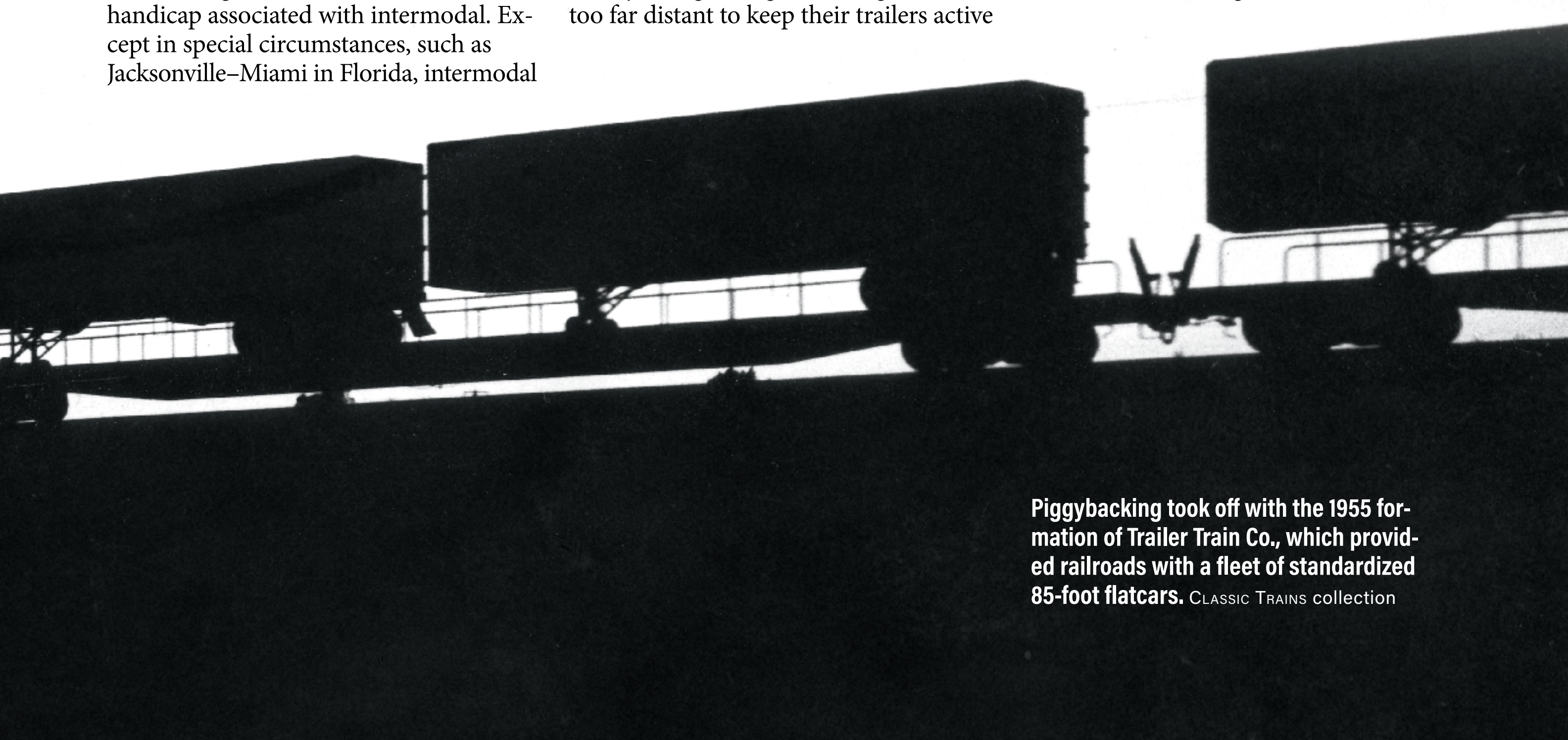
empty. Panicked that APL would cannibalize its own rapidly growing intermodal traffic by this move, Santa Fe formed its Intermodal Business Unit, which became a skunk works of innovation.

The big breakthrough by Santa Fe's IBU was to get shippers to agree to pricing by level of service — the faster and more reliably you wanted your trailer or container to get to its destination, the more you paid. At first many customers resisted, taking their business to competitors. Then the traffic began returning as Santa Fe demonstrated it could deliver on its promises. Service-based pricing became an industry norm. And railroads began closing their less-busy intermodal yards while investing in state-of-the-art mechanization of their major terminals. Cost control in tandem with pricing that justified running fast trains finally made intermodal a profit center almost everywhere. Today U.S. and Canadian railroads handle more containers and trailers than they do conventional railroad cars, although those conventional cars still generate more revenue.

But is intermodal, as visionaries have proclaimed for decades, the future of railroading? Not everyone is convinced, because barriers still remain. Price competition with truckers is intense. Because railroads can rarely provide the same quality of door-to-door intermodal service that trucks routinely deliver via the highway, rates are traditionally 20 percent or so below all-highway charges. Every time that discount tightens, the intermodal business sags. There's also a distance handicap associated with intermodal. Except in special circumstances, such as Jacksonville–Miami in Florida, intermodal is rarely price-competitive over distances of less than 700 miles. It's no coincidence that every experiment during the 1980s in running short, frequent piggyback trains over limited routes (Chicago–St. Louis, Chicago–St. Paul, and so on) and using reduced crews ended in failure.

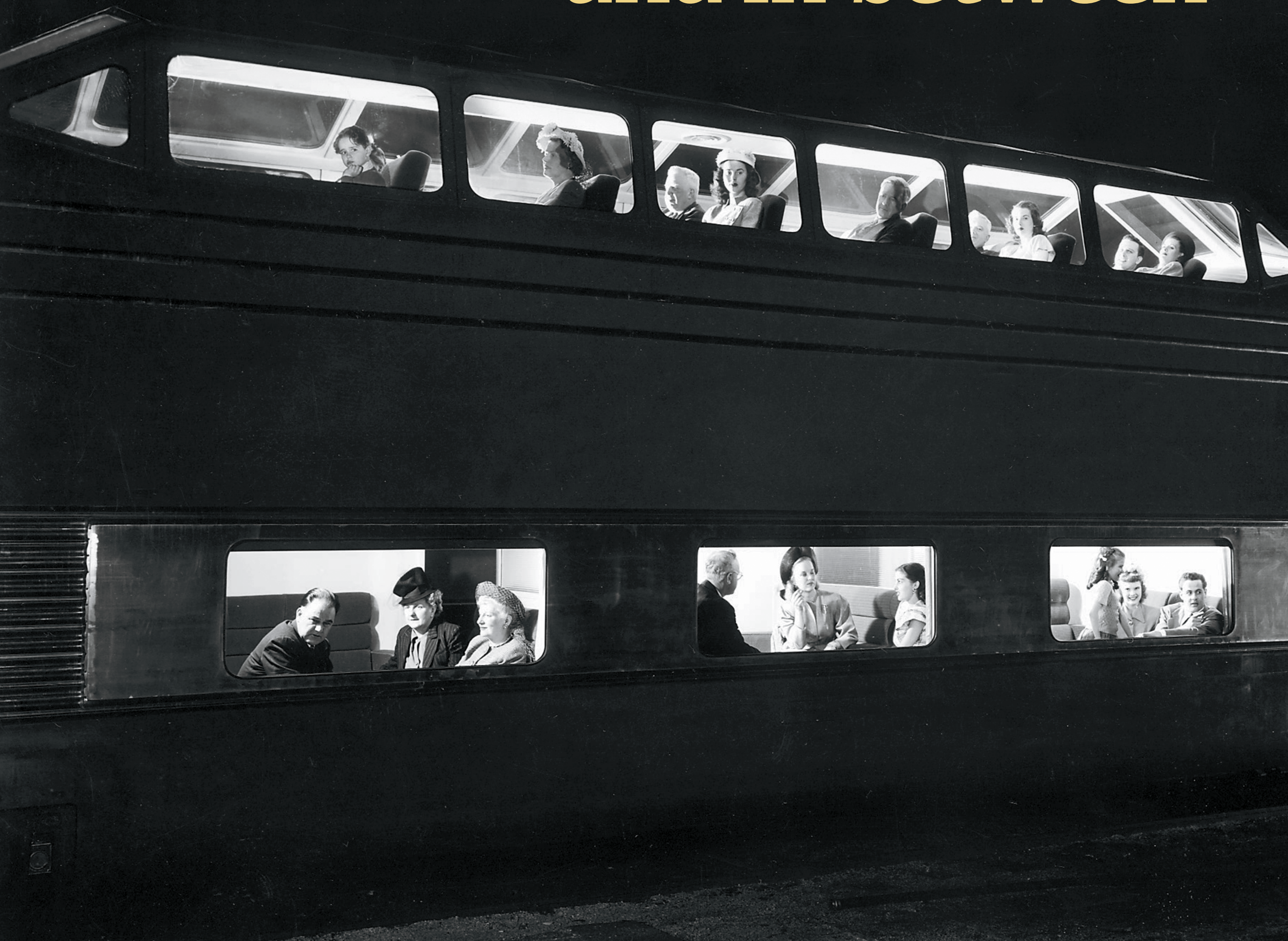
Finally, consider that some large cities are just not suited to intermodal service — at least as it's now defined. For example, BNSF Railway advertises no intermodal rate to Oklahoma City, and Union Pacific none to Phoenix. Both are largely consuming cities. Truckers get around this by triangulating — finding loads not too far distant to keep their trailers active — but for railroads moving empty equipment around is more difficult and costly.

Yet consider the inverse: railroads without their intermodal businesses. With coal, once the biggest commodity, in seemingly irreversible decline and U.S. manufacturing output little changed since 2000 and drifting away from rail dependence, intermodal remains a real success story. It took more than half a century for railroads to work through the economic problems associated with handling containers and trailers, but now it can be safely said that the Long Island Rail Road was on to something in 1884. ■



Piggybacking took off with the 1955 formation of Trailer Train Co., which provided railroads with a fleet of standardized 85-foot flatcars. Classic Trains collection

UPSTAIRS, downstairs, and in between



Dome cars epitomized the excitement of postwar train travel. The public was introduced to the concept when GM unveiled plans for its *Train of Tomorrow* in 1945. General Motors

INNOVATIVE CAR DESIGNS ADDED NEW DIMENSIONS TO RAIL TRAVEL

BY KEVIN J. HOLLAND

Terminology varies — bi-level, double-decker, duplex — but to railroads and carbuilders the goal is the same: to squeeze as much of a given function as possible into a passenger car's nominal 85-foot length, while remaining within weight and clearance limitations.

Benefits of bi-level passenger cars include lower per-seat costs than conventional single-level cars, and reduced operating costs since fewer cars are required to meet a given traffic demand. Fewer cars also means lower train weights, reducing motive-power requirements with corresponding savings in equipment and fuel. Shorter trains of higher-capacity cars can be accommodated at shorter station platforms, reducing station expenses, and don't require as much real estate for storage as do lower-capacity single-level cars.

In both commuter and intercity service, multi-level passenger cars have a long and varied history on North America's railroads.

DUPLEX SEATING AND SLEEPING

The Long Island Rail Road was an early adopter of multi-level seating. Between 1932 and 1949, 63 aluminum-bodied class MP70 electric multiple-unit commuter cars were built to a "duplex" configuration, with four-seat upper and lower seating alcoves accessed from a central aisle. The innovative design accommodated between 120 and 134 seated riders (compared with the 72 seats in one of the road's single-level [and shorter] MP54 cars), but loading, unloading, and ticket collection could be slow, and the seating alcoves were cramped and hard to clean. The "double-deckers," as they came to be known, proved unpopular, and the last ones were retired in 1972.

Duplex sleeping cars first appeared in the 1930s, employing an arrangement patented by the Pullman Company in 1929. Pullman's first two experimental duplex sleepers, *Voyager* and *Wanderer*, were rebuilt from conventional heavyweight 16-section sleepers in 1931. In 1933, two more experimental cars, *Nocturne* and *Eventide*, were rebuilt from baggage cars, and fitted with 16 duplex single rooms for service on the Pennsylvania.

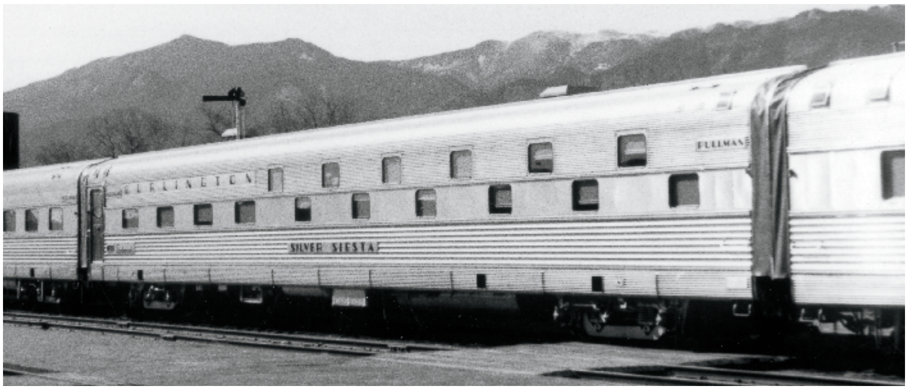
Pullman's first streamlined, or lightweight, duplex sleepers were built for PRR service in 1938 — the nine-car *Brook* series, with 12 duplex single rooms and 5 double bedrooms. Pullman built the experimental car *Duplex Roomette I* in 1942 (renamed *L. S. Hungerford* in 1949), containing 24 rooms, a dozen on either side of the single-level central aisle, with two steps leading to each upper room. Duplex-roomette sleepers became more numerous after World War II, although only Santa Fe and Canadian National acquired 24-duplex roomette cars.

The final variation on this theme was the budget-oriented Slumbercoach, introduced by Budd in 1956. The cars contained 8 double rooms and 24 duplex single rooms. Only 18 were built, for use on Baltimore & Ohio, Burlington, Missouri Pacific, and Northern Pacific. New York Central rebuilt a further 10 from all-roomette cars, calling them Sleepercoaches.

DOMES WITH A VIEW

Beginning in 1945, another type of car that offered seating on more than one level was the dome, in various configurations. Most common were cars with a 24-seat dome, accessed by a staircase from the main floor level, and with a small lounge area beneath the dome at a level below the main floor. Some cars built by Pullman-Standard and Budd had full-length upper-level domes, with a lounge and mechanical spaces below. Offering 360-degree vistas of the landscape, dome

Designed with mountain scenery in mind, dome cars also offered great views of the railroad and its operations. In Colorado, CB&Q's *Denver Zephyr* meets a freight in 1959. John S. Ingles



CB&Q Slumbercoach *Silver Siesta* has 12 duplex single rooms and 4 doubles on either side of a central corridor. Stacking of the singles greatly enhanced capacity. Roger Kemen

cars were the most notable new car type of the postwar "dream trains" era. Budd, Pullman-Standard, and ACF, plus two railroad shops, produced a total of 236 of them between 1945 and 1958.

GALLERY COMMUTER CARS

Postwar prosperity meant booming business for commuter railroads, and a bi-level design known as the "gallery car" reinvented commuting for passengers in Chicago and San Francisco in the 1950s. Ticket collecting in a true double-deck car was problematic, where a single conductor would be hard-pressed to monitor passengers on both levels. The gallery concept offered a solution, in which upper-level seating was on what amounted to a pair of shelves along the length of the car, with the conductor able to reach up from the lower level to check tickets. Burlington Route introduced the concept in 1950 with 30 cars from Budd, and Chicago & North Western soon followed suit with cars from St. Louis Car and Pullman-Standard; some were built early enough to be pulled by steam locomotives. A decade later, Rock Island and Milwaukee Road added bi-levels to their Chicago commuter operations. Southern Pacific acquired P-S gallery cars for its suburban trains out of San Francisco.

To replace its 1920s single-level electric multiple-unit cars in Chicago suburban service, Illinois Central acquired 130 gallery-style M.U. cars from St. Louis Car in 1971; Bombardier built 36 more in 1978-79. Chicago RTA's Metra retired the last "Highliners" in 2016, with a new generation of Highliner IIs from Nippon Sharyo replacing them. The builder delivered 14 similar cars in 2007 to Indiana's South Shore Line, which reaches downtown Chicago via Metra's Electric Division.

TRUE DOUBLE-DECKERS

Santa Fe introduced true double-deck equipment to U.S. intercity service with its "Hi-Level" fleet, conceived and built by Budd. Two prototype coaches entered service on the *El Capitan* in 1954, and their success led to a 47-car order (35 coaches with 68 or 72 seats, 6 diners, and 6 lounges), entering service as the fully re-equipped *El Capitan* in July 1956. An additional 24 Hi-Level coaches partially re-equipped Santa Fe's *San Francisco Chief* in 1963-64.

By that time, C&NW had become the second U.S. operator of bi-level intercity cars, having acquired 13 P-S gallery cars in 1958 for the *Flambeau 400* and *Peninsula 400* between Chicago and Ashland, Wis., and Ishpeming, Mich., respectively. C&NW cosmetically modified two conventional dining cars with false roofs to match the bi-levels' higher profile.

Santa Fe introduced true double-deck equipment to U.S. intercity service with its Hi-Level fleet of coach, dining, and lounge cars.

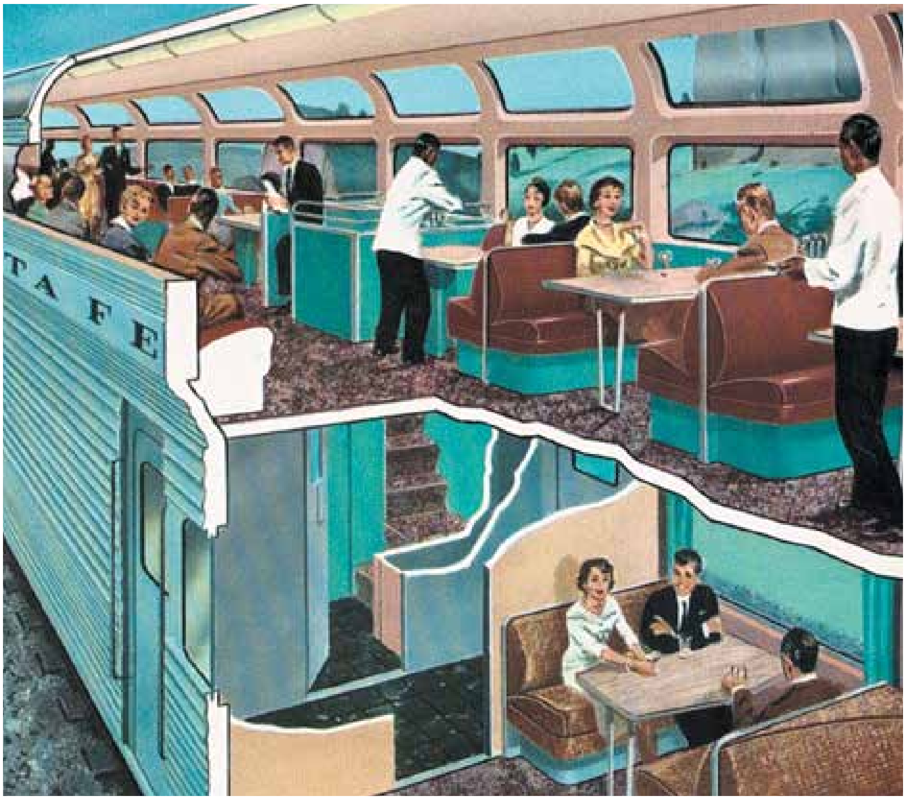
Amtrak, faced with the need to re-equip its western long-distance trains, drew on Santa Fe's Hi-Level experience and in the mid-1970s ordered the first "Superliner" cars from Pullman-Standard. Between 1979 and '81, the builder constructed 284 Superliners in coach, coach-baggage, sleeper, diner, and "Sightseer" lounge configurations. To bolster the fleet, Bombardier delivered 195 Superliner II cars to Amtrak between 1991 and '96. Meantime, high-density coach

Burlington Route pioneered the gallery-style bi-level commuter car in 1950. CB&Q

Hawker Siddeley, which acquired Canadian Car & Foundry in 1957, supplied lozenge-shaped cars to Toronto's GO Transit in 1977. Their three-level format has since found wide use. Jim Hediger variants of the Superliner design were produced for state-supported operations in California, by Morrison-Knudsen in 1994–97 as "California cars" and Alstom during 2000–02.

Back on the commuter front, the bi-level car has continued to evolve. Canadian Vickers built nine gallery cars — Canada's first bi-level commuter cars — in 1969 for CP Rail's Montreal suburban service. For Toronto's GO Transit agency, Hawker Siddeley introduced an innovative design in 1977, with seating on two main floor levels as well as a mid-level at each end over the trucks. That design has become an industry standard adopted by many commuter operators in the U.S. and Canada, and remains in production by Bombardier. More recently, low-profile bi-level designs from Bombardier and other builders have overcome clearance limitations in the Northeast, and have reinvented commuter service out of Washington, New York, Boston, and Montreal. ■

KEVIN J. HOLLAND is a writer, editor, and publications designer living in Ontario. This is his 14th article in a CLASSIC TRAINS publication.



A cutaway illustration of a 1956 Santa Fe Hi-Level lounge car shows the double-deck arrangement. Unlike earlier bi-level designs, the upper portion was the primary level. Santa Fe

The Santa Fe Hi-Level cars were the template for Amtrak's Superliners, introduced in 1979. In this March 1995 photo of the westbound *Southwest Chief* at Ribera, N.Mex., the last five cars are Superliners, while the two ahead of them are ex-Santa Fe Hi-Level coaches. John C. Lucas

BY JERRY A. PINKEPANK

More freight, fewer

In 1916, the peak year for U.S. Class I railroad route-miles, those 100-plus carriers employed 1,559,158 people. If we assume 85 percent of those employees, or 1,325,284, were allocated to freight traffic — which totaled almost 339 billion ton-miles — this works out to 256,441 ton-miles per employee. Contrast this with 1999, when 228,000 freight railroad employees were handling 1.4 *trillion* ton-miles, or 6,287,110 per employee, 24½ times as much.

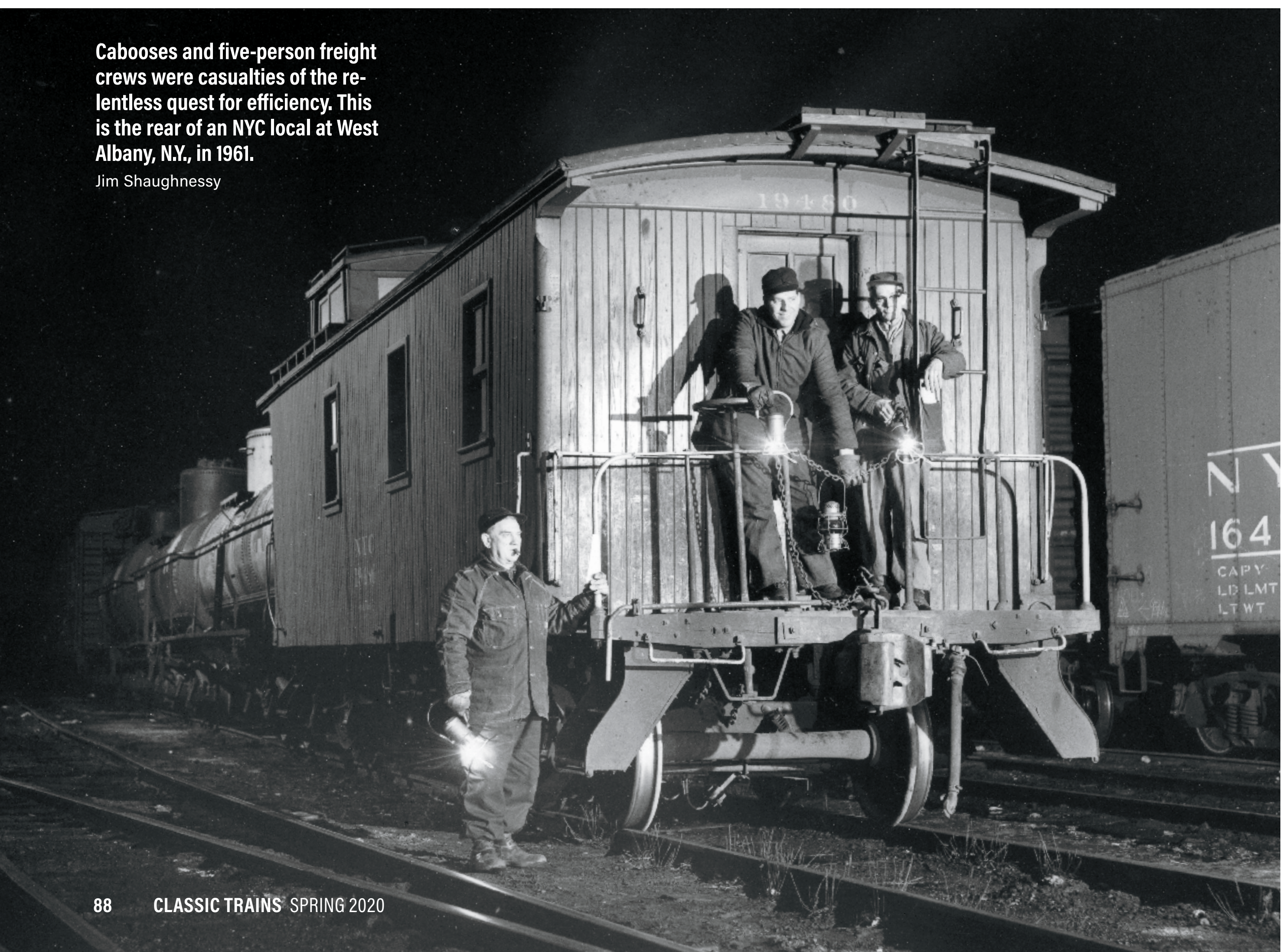
INCREASED TRAIN SIZE

A typical freight of 1916 might handle 2,000 trailing tons, of which — owing to a normal mix of loads and empties — less than half would represent revenue ton-miles. By 1999, many specialized trains existed, examples being unit coal and grain trains and double-stack container trains. Most unit trains are designed to operate one way empty to get the equipment back for the next load, but when considered as a round trip, *i.e.*, only 50 percent loaded, the average round-trip move still would be of 7,000 trailing tons for a typical coal train and 5,500 for a typical grain train. Conventional "mixed merchandise" trains, with cars of various commodities and destinations, whether loaded and empty, similarly average to perhaps triple their 1916 equivalent.

Many factors contribute to increased train size: diesel power, enhanced by modern wheel-slip control and A.C. traction motors; cars that carry 100 tons or more on roller-bearing axles instead of 35 tons per loaded car with plain bearings; improved route profiles; and lower rolling resistance of track, for a long time now laid with heavier rail welded continuously on heavily ballasted roadbed.

CREWS OF FEWER PERSONS

Intelligent collective bargaining agreements, in which negotiators of both labor and management knew what had to be done to keep the industry competitive, still have provided the protection of attrition agreements for affected employees.



Cabooses and five-person freight crews were casualties of the relentless quest for efficiency. This is the rear of an NYC local at West Albany, N.Y., in 1961.
Jim Shaughnessy

AIDED BY TECHNOLOGICAL ADVANCES AND SENSIBLE WORK AGREEMENTS, GROWTH IN RAIL LABOR PRODUCTIVITY HAS BEEN CONTINUAL

people

Landmarks in this effort were the agreements of the 1970s and '80s which eliminated locomotive firemen, and cabooses, and gradually reduced road-train crews from five persons to two. They also provided for direct delivery of trains to connections by road crews instead of using transfer crews, and allowed reciprocal interchange arrangements that enabled two-way loaded moves to replace the practice of a delivering crew returning "caboose light." Many carriers negotiated run-through agreements that permitted one crew to go all the way through extended districts of over 200 miles. Usually this was accomplished by allocating the paid mileage between crews from two home terminals, running through what had been the away terminal for both.

The elimination of the caboose came about as technology advanced, with visual observation of the train from the rear end being replaced, and improved, by trackside failed-equipment detectors. Electronic rear-end devices handled former caboose air-brake functions.

LESS CLERICAL STAFF

Once again, intelligent collective bargaining agreements resulted in adoption of labor-saving measures and taking advantage of advancing computer and communications technology. The range of these improvements has been vast, many being covered elsewhere in this issue, one example being the use of centralized traffic control. The concentration of train-dispatching and crew-calling for entire railroads from a single operations center resulted in large savings. Beyond operations, computers revolutionized accounting data, eliminating paper waybills and all the procedures that went with them. The role of automatic car identification has been critical.

REDUCED MAINTENANCE FORCES

In track maintenance, tampers replaced dozens of men tamping by hand, and combine in the same machine the functions of tamping and lining, which also required dozens of men shoving in rhythm on lining bars. The adoption of continuous welded rail on heavy ballast eliminated all the bolt-tightening and broken-bar replacement work that rail joints every 39 feet had required, not to mention the extra tamping at low joints that recurred so often under heavy traffic. The adoption of electronic flaw detection, both of rail flaws and deviations of line and surface, and now even of the state of tie condition and of rail-head wear, greatly reduced wasteful cycle maintenance, replaced with maintenance by observed condition. Besides allowing increased employee productivity, these technological improvements have reduced accidents.

IMPROVED ROLLING STOCK

Dieselization alone cut locomotive maintenance staff to less than one-fourth the number of employees that steam required, but since dieselization, other factors have helped. The advance from a typical road unit producing 1,500 horsepower to being rated at over 4,000, along with modular control circuits and more reliable engine components, have resulted in fewer units overall, hence reduced maintenance manpower.

Numerous factors have combined to greatly reduce the role of locomotive backshops as well. One is leasing, as units are returned to the lessor that otherwise would have required a heavy overhaul, but an even greater factor has been the adoption of running-shop maintenance based on condition, rather than on sending locomotives to the shops based only on mileage accumulated. Similarly, more frequent oil-sample testing, with results shared on daily conference calls, allow such things as changing pistons individually based on wear, rather than replacing them all at once based on mileage regardless of condition. Another factor contributing to this increase in condition-based maintenance has been, since the1980s, the practice of having manufacturer representatives on site at major shops to supervise maintenance, with parts inventory supplied under the terms of the lease.

Regarding freight-car maintenance, roller bearings are not lubricated in the field but are repacked in automated wheel shops during the replacement of one-wear wheels, because the wear mileage on the wheels coincides well with the reliable mileage attainable with sealed bearings. Further, the adoption of higher-capacity cars has meant fewer of them, thus a reduction in the maintenance-demanding coupling and air-brake systems of each car. Also, more rapid equipment turnarounds have helped reduce the size of car fleets, cutting the need for carshop employees.

Welded rail and mechanical tampers/liners have ended the need for large crews that maintained track with hand tools. Classic Trains collection

The increased productivity of railroad employees has allowed them to be among the best paid workers in American industry, and rightly so, because one thing has not changed — the 24/7 operation of the "industry without a roof." Railroading, with its operating workforce dispersed and largely self-supervised over thousands of miles, responsible for massive, fast-moving trains, still demands a military-like discipline that disregards weather and time of day or day of week; requires drug-and-alcohol-free alertness at all times; and demands a work ethic and protect-your-fellow-worker ethos seldom found elsewhere in civilian life. ■

Reversing course

WHAT AND WHO HELPED BRING BACK PASSENGER RAIL

BY BOB JOHNSTON

The slow decline of passenger rail looked like it would end soon after mid-century with a handful of cross-country trains limping into their terminals for the last time. This bleak reality came after federally subsidized Interstate highways and jet aircraft began crisscrossing the nation in the 1950s. Interurbans and street railways had already given up the ghost, while railroads that had commuter operations appeared to be in a death spiral as they struggled to maintain aging equipment. Fortunately, that's not what happened; here are some key reasons.

METROLINER

The seeds of resurgence were sown in the Northeast in 1965. Rhode Island Democratic U.S. Sen. Claiborne Pell successfully pushed Congress and the Johnson Administration to pass the High Speed Ground Transportation Act. The legislation, in turn, provided justification to help underwrite the Pennsylvania Railroad's nascent Metroliner project. In conjunction with Philadelphia's Budd Company, PRR had sought a way to become time- and comfort-competitive on its New York–Washington route in the face of patronage siphoned off by Eastern Air-lines' hourly shuttles and the Interstate 95 threat. Now, with federal backing, a viable passenger rail alternative became a public objective. The speedy, self-propelled electrics, based on a Budd Silverliner multiple-unit commuter car design utilizing Westinghouse and General Electric propulsion, were designed to reach top speeds of 160 mph. Pell also made certain his non-electrified Northeast Corridor state was included in equipment development, prompting the Commerce Department to strike a deal with United Aircraft and the New Haven Railroad to develop the first domestically

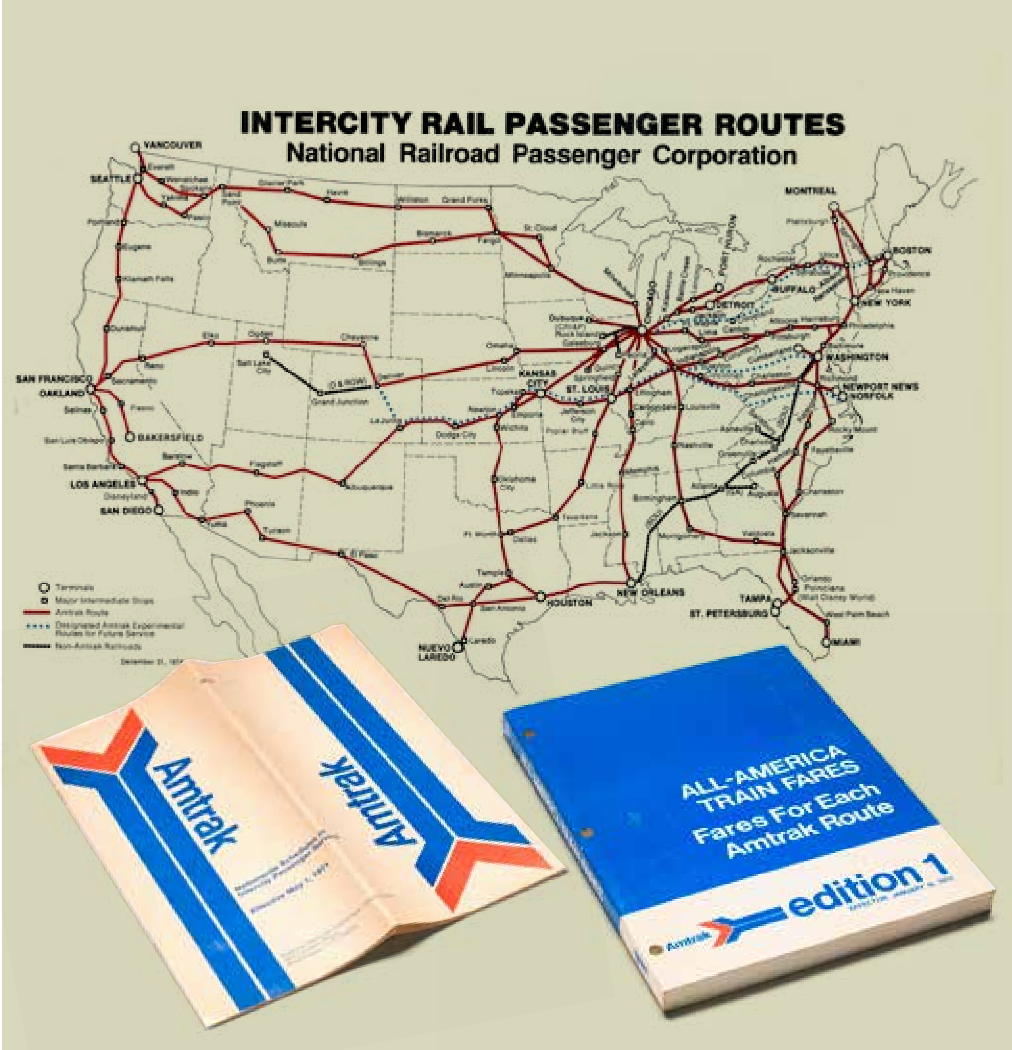
produced "jet-propelled" TurboTrain.

The Metroliner era started with one revenue New York–Washington round trip on January 16, 1969. Additional frequencies soon created a buzz and glimmer of hope that the newly merged Penn Central was looking for. But the giant railroad continued to hemorrhage money when once-touted consolidation efficiencies failed to materialize, and PC slipped into bankruptcy the following year. Facing rapidly deteriorating track conditions and the prospect of losing key passenger and freight rail corridors in the East, lawmakers and the Nixon Administration kicked around several scenarios involving subsidies, but eventually settled on the quasi-public National Railroad Passenger Corp. model.

AMTRAK

Welcomed by railroads as a way to get out of the passenger train business quickly, though viewed by many politicians as a stopgap measure, Amtrak's launch on May 1, 1971, kept a national system intact. The company's enthusiastic neophyte managers immediately began to reverse congenital weaknesses that separate operators never chose to rectify:

- Schedule meaningful connections between once-disparate routes to grow ridership (starting with Chicago, which included consolidating all trains at Union Station)
- Develop a uniform national telephone center, reservation system, and ticketing scheme (no more convoluted "wiring for space" to the station where a train originated)
- Utilize the best passenger cars and locomotives (deploying domes across America and retiring those beat-up New Haven coaches with rainwater sloshing in their windows)
- Create a nationwide marketing platform and brand to stimulate demand (filling the void left by many lines that gave up advertising in the 1950s).



Amtrak's creation in 1971 brought about the first unified route map, timetable, and fare structure for passenger rail travelers in the U.S. Classic Trains collection

Wearing a mix of Penn Central and Amtrak markings, a *Metroliner* rolls through Lanham, Md., in January 1975. Stephen J. Salamon

OIL EMBARGO

Those early actions prepared Amtrak for the travel crunch caused by the 1973 OPEC oil embargo. Gas shortages and steep price rises galvanized political support that boosted Amtrak's trajectory at precisely the moment its management faced replacing the worn-out hand-me-down equipment it had inherited. Until then, the company had been urged by Department of Transportation overseers to purchase only modified freight locomotives, like EMD's SDP40Fs and General Electric's P30CH diesels and E60 electrics, because they could be converted to freight use. That thinking abruptly changed because the so-called "energy crisis" prompted lawmakers to support public funding to significantly modernize Amtrak. As a result, the company was able to acquire 492 Metroliner-based, single-level Amfleet cars; 290 F40PH diesel locomotives; 47 AEM7 electrics; and 284 bi-level Superliners in its first decade. More of each would be added in the years to follow.

PAUL REISTRUP

Paul Reistrup shepherded these pivotal investments through Congress after succeeding Roger Lewis in 1975 as Amtrak's

Amtrak's second president, Paul H. Reistrup, came from the C&O/B&O. Don Phillips

second president. His experience as a passenger train innovator at the Baltimore & Ohio and Chesapeake & Ohio in the 1960s provided instant credibility, but his perseverance with lawmakers and the DOT under two U.S. presidents for continued investment came at a critical time. Amtrak's acquisition of Penn Central's Northeast Corridor and Beech Grove, Ind., shops also occurred on Reistrup's watch, when it was important to have a real railroader at the helm who valued their importance. The irony is that his contract wasn't renewed in 1978, before the equipment he championed could generate the efficiencies that would greatly reduce Amtrak's need for operating support. With costs rising while awaiting the new equipment, the Carter Administration made budget cuts in 1979. The casualties included the *Floridian*, *National Limited*, *Lone Star*, and *North Coast Hiawatha* — routes that never returned.

President W. Graham Claytor, right, stands in front of an F40PH locomotive. The 1973 OPEC oil embargo solidified support for funding new Amtrak equipment, including these units. Amtrak

GRAHAM CLAYTOR

Decimation of the network might have continued had not another strong, outspoken, and well-respected railroad leader replaced Alan Boyd in 1982. This occurred just as the Reagan Administration, under budget chief David Stockman, attempted to "zero out" Amtrak funding. W. Graham Claytor Jr., the former U.S. Navy Secretary and Southern Railway president, not only withstood the attacks but went on a revenue growth offensive by enhancing onboard amenities; launching the *Auto Train*; extending the *Sunset Limited* to Florida; and ordering Horizon coaches, additional Superliners, all-new GE Genesis diesel locomotives, and Viewliner sleepers.

FUNDING

Claytor made a valiant but ultimately unsuccessful attempt to push Capitol Hill politicians to provide Amtrak with one cent per gallon of gas-tax money from the federal Highway Trust Fund. He called it an "Ampenny." Such a move would have provided Amtrak with a predictable income stream instead of being subject to the vagaries of annual appropriations.

Claytor had been encouraged by passage of the Surface Transportation Act of 1982, which — for the first time since government federal highway aid began in 1912 — created a Mass Transit Account to fund municipal rail systems. Passed by a coalition of rural and urban legislators as a condition for their approval of a nationwide gas tax increase, the breakthrough amounted to one-ninth of the appropriation. That translated into $1.1 billion for commuter rail and transit systems.

The new endowment, coupled with earmarks and legislation encouraging "new starts," began to reverse decades of federal funding decisions favoring roads. Though regional and state initiatives born out of municipal gridlock had created Bay Area Rapid Transit in San Francisco/Oakland, the Washington, D.C., Metro, and other systems, funding for light rail and commuter rail could suddenly be stretched further than ever. Planning, environmental concerns, and construction took time, but it wasn't long before operations sprouted in Miami, Salt Lake City, Denver, and Dallas that had devolved to buses decades earlier.

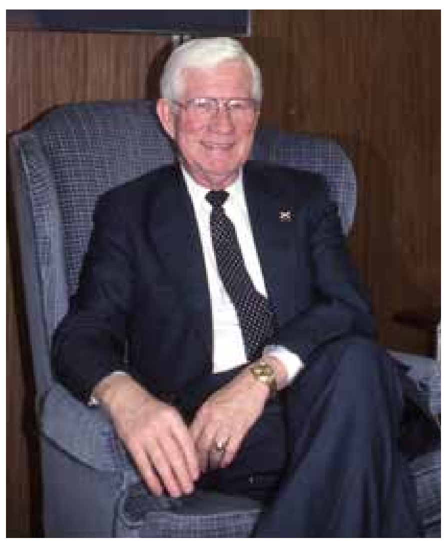
California doubled down on public mobility when, in 1990, its voters ap-

New California Cars snake past the interlocking tower at Los Angeles Union Station in early 2000. California funded the cars in the 1990s with legislation that also expanded service on three intrastate corridors: *Capitol Corridor*, *Pacific Surfliners*, and *San Joaquins*. David C. Warner

proved the Passenger Rail and Clean Air Bond Act (Proposition 108) and a companion incremental tax gas-tax carve-out for non-highway projects (Proposition 111). Together, they ushered in an era of dramatic investment leading to the purchase of a fleet of bi-level "California Cars," robust expansion of the *Capitol Corridor* and *San Joaquins*, and transformation of the San Diego–Los Angeles corridor north to San Luis Obispo into today's *Pacific Surfliner* service.

GIL CARMICHAEL

Perhaps the most significant stimulant for facilities investment occurred with the passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). That legislation encouraged development of multimodal stations, and for the first time, designated high speed rail corridors. Gilbert Carmichael, President George H.W. Bush's Federal Railroad Administrator, promoted the bill's passage and lined up allies within the Department of Transportation that put the FRA on a more equal footing with the agency's other components. North Carolina and other states made extensive use of ISTEA's matching-grant program to revitalize and transform aging rail stations into modern facilities supporting additional service. Carmichael never achieved his goal of breaking down the still-existing silos between highway, air, and rail funding, but his legacy is visible today at transportation hubs from Seattle to Miami that help passengers transfer among buses, intercity trains, and local transit.



Federal Railroad Administrator Gil Carmichael, the "Father of Multi-modalism," poses in his office in January 1991. Bob Johnston

Passengers board an Amfleet coach at Alexandria, Va., in 1995. The cars are based on the 1960s Metroliner design. David C. Warner

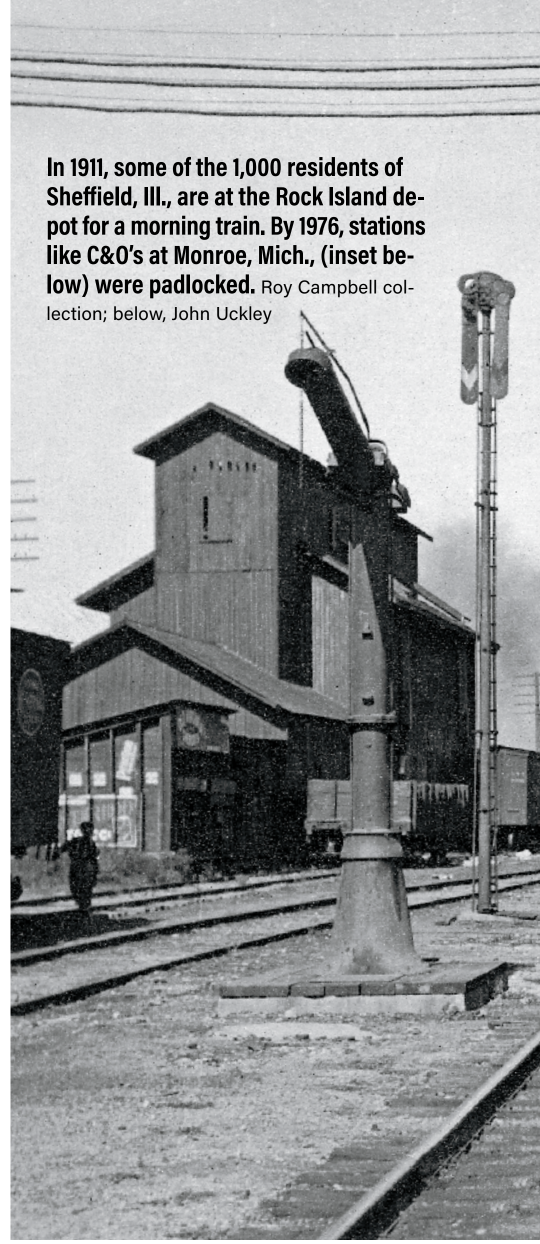
Passenger and commuter rail's growth spurt through the second half of the 20th century couldn't have been predicted when the period began, and systems we have today still struggle to withstand some of the same challenges. Yet key events such as the High Speed Ground Transportation Act's support of Metroliner development and the OPEC oil embargo created a chain reaction of opportunities for Paul Reistrup, Graham Claytor, Gill Carmichael, and countless other visionaries to lay the groundwork for Acela, publicly funded rail corridor improvements, and proliferation of the numerous commuter and light rail systems we have today. ■

BOB JOHNSTON has covered passenger rail news and operations for TRAINS since 1991. This is his fifth byline in a CLASSIC TRAINS publication.

Down by the station

ONCE THE CENTER OF SMALL TOWN LIFE, COUNTRY DEPOTS GRADUALLY FADED FROM THE SCENE

BY H. ROGER GRANT



In 1911, some of the 1,000 residents of Sheffield, Ill., are at the Rock Island depot for a morning train. By 1976, stations like C&O's at Monroe, Mich., (inset below) were padlocked. Roy Campbell collection; below, John Uckley

The 20th century witnessed both the vitality of the country railroad station and its virtual demise. For generations of Americans the "deepo" served as a community hub. While cities had their great monuments to the Railroad Age, towns and villages had their depots. The standardized combination-style dominated: baggage-freight room, center office, and waiting room. By World War I an estimated 50,000 served the public. Since railroad lines blanketed large parts of the country, multiple stations might be found in a single small town.

During the heyday of the country station, virtually everyone knew its location, the name of the agent, and the services it provided. The depot served as a town's link to the outside world. Residents found "train time" an exciting high point in their daily routine.

In many towns the station agent was probably as well known as the pastor, priest, or physician. The agent helped townsfolk plan travel itineraries, sold tickets, and reported freight and express shipments. These activities affected everyone; virtually all merchandise and the U.S. mail arrived and left by rail. In some places the agent's chances for exposure increased when the depot contained living quarters (usually upstairs) for himself and his family. Even if the agent did not reside in the building, he may have gotten additional attention because he sold postcards, stamps, and other oddments. Occasionally he became the "reading man," helping individuals who had no or limited reading abilities. And, of course, the agent knew Morse code. The chattering telegraph instruments carried more than railroad business; they delivered and sent commercial messages from Western Union and other firms.

After World War I, the number of depots began to fall. A contributing factor involved a shrinking railroad network. When rails were lifted, there was no need for a depot.

Although greater automobile ownership, increased bus ridership, expansion of all-weather roads, and the hard times of the 1930s caused residents to forsake train travel, the advent of World War II saw a resurgence in passenger patronage and hence more activities at the depot. But after the war motorists returned to their earlier ways, except perhaps for long-distance trips. Yet most streamliners did not serve country stations, especially those situated on branch or secondary lines.

Important changes were in the offing. Country depots no longer performed their historic roles. After mid-century, branchline passenger service, especially, was disappearing, as were mainline locals. Furthermore, truck competition led to the nearly total disappearance of less-than-carload freight by the 1960s. The need for local agents to manage train control was lessening or no longer required. Once, having agents at closely spaced depots made sense; they needed to report train movements to dispatchers and to issue train orders. Telephones, radios, CTC, and other advanced technologies made telegraph keys relics of the past. Fewer passenger and longer freight trains were two additional contributing factors. The "merger madness" of the 1960s often prompted combined carriers to abandon or sell off redundant trackage.

During the late 1950s a major event took place that contributed to the demise of the country depot. Ben W. Heineman, board chairman of the Chicago & North Western, recognized that these stations and their agents were largely obsolete. In 1957 C&NW applied to the South Dakota Public Utilities Commission to create a statewide "central agency" network, elim-

inating unneeded stations and their agent-operators. There were 61 stations in the state where agents did minimal work, perhaps no more than a few hours a day. Some completed their daily chores in less than 30 minutes. Regulators accepted the railroad's position, but the Order of Railroad Telegraphers, which represented agent-operators, did not, especially when the railroad sought similar cutbacks in other states. C&NW took a strike in 1962. In the binding arbitration that followed, the company accomplished most of its objectives. Other carriers followed suit.

The 1960s brought fewer agents and more shuttered depots. The strategies of carriers to serve customers varied. Some roads used the central agency approach. Others sent agents from depot to depot, perhaps visiting two or more in one day. For years the Minnesota Warehouse & Railroad Commission demanded that if a railroad did business in a community, it must maintain a depot building there, and so railroads moved their agents about. There was another approach. In 1968 the Illinois Central launched a program where it operated customer vans that took over the functions of the closed stations. Union Pacific likely claimed the largest fleet of "Mobile Agency Service" vehicles.

What happened to the country depot? The vast majority were demolished. While over time agents disappeared, railroads retained some depots for storage, being used often for maintenance-of-way and signal equipment. Also there were non-rail adaptations. Some structures, often of the combination type, might remain in place, usually if lines were abandoned. Where tracks remained active, railroads often required their removal from the right of way. Repurposed depots might become a commercial business like a barbershop, office, restaurant, or some other enterprise. Many became private dwellings, farm buildings, or storage sheds.

Reflecting the depot's importance in a town's collective memory, many went on to serve civic functions such as museums or visitor centers. These buildings were affordable; in fact, railroads might donate them to nonprofit entities. Interiors were suitable for museum purposes: the waiting room could become an exhibit area, the office could remain as such, and the baggage-freight section could be utilized for storage of artifacts. Some became railroad museums, complete with memorabilia and perhaps a caboose out front.

The surviving country stations, and their companion larger county-seat depots, are tangible reminders of the Railroad Age. They recall the once-important roles played by the "deepo" and its agent in community life. ∎