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I Mix-or-match years on the Canad

TODAY we look for the unusual in the hookup of different diesel types into a single multipled locomotive, but once for a very short time we also knew a magical period in locomotive history when the mix-or-match principle involved steam and diesel power. For example, few diesel road units existed on Canadian National in 1951, and when one made its appearance the occasion seemed almost a welcome break in the monotony of steam power. But when a big steamer led a shiny new diesel out onto the main line, that was indeed a notable sign of a season of flux in the great motive-power metamorphosis.

Eastbound from Toronto, CNR's main line as
the Scarboro Bluff to climb out of the Lake O
basin. The ruling grade is just over 1 per ce
the 9 miles to Scarboro Junction, where h
cut off and turned on a wye before returnin
Mimico enginehouse to await the next eastl
call. Leading two new Electro-Motive F3 un
this hill is a brutish-looking T2a 2-10-2. The
bulging tender cistern dwarfs the A unit's ro
nose as deep and thunderous exhausts blend
the steady roar of V16's to move the eastl
tonnage out of town and up the bluff.

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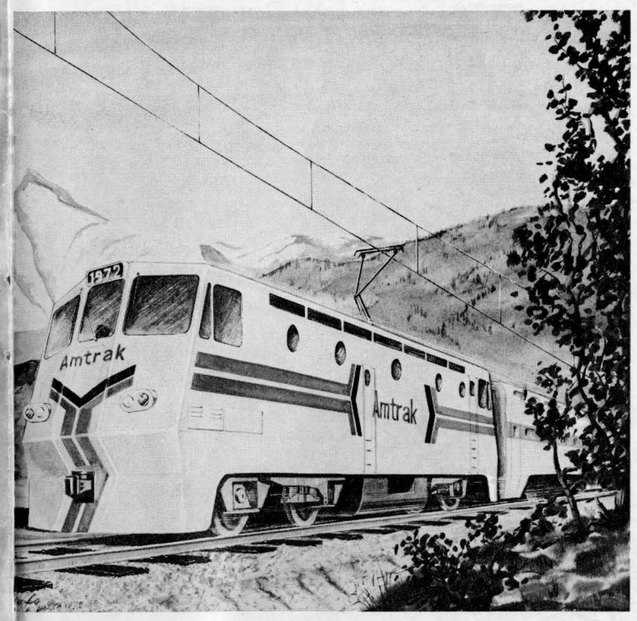


GENERAL ELECTRIC'S proposed passenger diesel for Amtrak (far left) looks very much like the custom U30CG unit built for Santa Fe (and even sports an AT&SF road number). EMD's proposed passenger diesel for Amtrak reportedly resembles an FP45, and EMD's passenger-electric design (left) has a foreign look probably influenced by the fact that EMD has become the U. S. licensee for a Swedish builder.

Central's sole remaining E6 (rebuilt No. 4001), which was offered but which Amtrak did not consider. No PC FL9's were considered because of their high maintenance costs.

Dozens of well-maintained first-generation diesels were not purchased for a variety of nonmechanical reasons. Santa Fe has decided to rebuild many of its passenger covered wagons into hood units for freight service, and Amtrak could not come to financial terms with such passenger diesel owners as IC and MoPac. In the end, Amtrak contracted to pay 7.3 million dollars for its 262 units — an average of $25,000 for each diesel unit and $50,000 for each GG1.

Eyebrows might be raised at the purchase of so many PC diesels, but Amtrak officials point out that bankruptcy at the cashbox does not necessarily mean incompetence on the ready track. David G. Goehring, Amtrak general superintendent of locomotives, points out that, for one thing, PC put two steam generators in every E unit, meaning that a breakdown of one generator was no emergency even in the middle of winter. And Amtrak plans to run a lot of one-unit trains. Also, many PC passenger diesels were put through a railroad re-engine program during the three years just before the bankruptcy.

There was another compelling reason for buying PC diesels. PC uses complicated cab signal systems that would cost thousands of dollars per unit to install on non-PC units. For that reason, all PC trains will be pulled only by PC engines. Other assignments: SCL, RF&P, and L&N units will remain in Florida service; Milwaukee units will continue on the Milwaukee-Chicago-St. Louis run; BN E units will take over between Chicago and Havre, Mont., and will stay on between Seattle and Portland; and UP and B&O/C&O units will be spread around the country. The BN and SP F's were bought for Minneapolis-Spokane and Havre-Seattle service where grades might damage E-unit traction motors.

All the E and F units now will undergo a systematic refurbishing program that Goehring says will be "just short of a complete rebuild." Every unit has undergone an exhaustive 82-point inspection, and the results are being fed into an IBM computer which will help to decide when the units will go into the shop. About half of the units will undergo the complete refurbishing program by the end of 1973; most of the rest were considered to be in good shape already, and they will receive complete overhaul after the worst units are finished. Goehring figures it will take from $55,000 to $100,000 to overhaul each E unit and about $40,000 for each F unit. Plans call for each unit to be re-engined at least every four years and to receive a new generator at least every eight years. Amtrak is taken with the E unit and plans to keep E's running as long as possible — at least a decade and probably longer. New diesels will supplement rather than replace the E units.

E units also will survive in non-Amtrak jobs, of course. Those not traded in may go into freight and mail-train service, and many will continue to haul commuters in the Chicago and New York areas. C&NW plans an upgrading program for its commuter E's and would like to standardize on all E units for its service. UP has set aside 8 units for special train service, and Southern is refurbishing 14 E8's for the *Southern Crescent* — repainting them green and applying the train name in gold script on the sides of the nose. Precision National Corporation is buying an undetermined number of the E and F units Amtrak passed up and apparently will recondition various parts but not the entire locomotives.

WHEN Amtrak first went shopping for new diesels, it approached EMD about the possibility of building another generation of E unit, something like an E10. But EMD had thrown away the pattern for the E-unit underbody (the last E9's were built on trade-in frames), and the expense of building anything but a single-engine unit became prohibitive.

As TRAINS went to press, Amtrak still was drawing up final specifications for its new diesels, but a profile of the unit already had emerged. It will be a single-engine unit in the 3000-to-3600 h.p. range with two steam generators and a high liquid (fuel and water) capacity — at least 5500 gallons—but it will *not* be a hood unit. Amtrak has decided that for purposes of both esthetics and internal capacity (for the extra steam generator) its diesels will be cab units. Amtrak hopes to decide on a builder — either EMD or General Electric, or possibly both — and to take delivery of its first units during the first quarter of 1973. The first batch should be about 30 units and the eventual total order about 100.

Amtrak will go slower on buying new electric units. Diesel technology is readily available in this country, but no new electric passenger locomotive has been built in the U. S. since the GG1. Amtrak has decided to stick with an American builder for political reasons, cutting out a number of experienced European builders — that is, unless one would quickly buy out an American subsidiary. Logically GE would be thought of as the runaway favorite to build any electric locomotive, but EMD also is actively in the running. It has bought the license from ASEA, a Swedish builder, to construct electric locomotives for the American market. And like GE, EMD has submitted a series of proposals to Amtrak for both diesel and electric locomotives.

Amtrak first will order a small number of electrics, work the bugs out of them, and then within four to five years order enough to run the Northeast Corridor's regular trains. That will spell an end to the GG1, although not necessarily because Amtrak wants to dump the ageless electrics. PC and the Government now are talking about the possibility of changing PC electrification from 11,000-volt, 25-cycle A.C. to 25,000-volt, 60-cycle, which would mean the end of the GG1 in both passenger and freight service because it could not economically be adapted. The new electrics would be much higher horsepower than the diesels, probably in the range of 7500 h.p. A GG1 is rated at about 4600 h.p. I

Black lines and white (red) lines

THIS is Penn Central's map as its trustees see the system. The lines shown in black, which represent approximately 11,000 route-miles, produced 80 per cent of PC's revenues in 1970 and constitute the "core" of the railroad "where the utilization of Penn Central's plant, equipment, and personnel appears to peak." The trustees are careful to point out that they have NOT (they capitalize the word) said the remaining 9000 lines shown in white should be abandoned. Still, under the ICC's proposal that lines carrying fewer than 34 carloads per mile per year [page 3, July TRAINS], 3900 PC route-miles would qualify for abandonment; and under a DOT recommendation that lines generating less than a million gross ton-miles per mile per year, 7000 PC route-miles could be torn up. As it is, to date the trustees themselves have petitioned to abandon 3598 "white-line" miles; formal permission has been granted by the ICC to abandon some 480 miles.

THE PROFESSIONAL ICONOCLAST

JOHN G. KNEILING, P.E., Consulting Engineer

Plan tomorrow's railroad

I NO ONE doubts that the U. S. railroad plant is overbuilt and that much of it must go. To illustrate some specifics, let us assume we are Penn Central management and take a look at its Chicago plant. Track that offers little promise has to go, right? Right.

Track that can be a viable part of the railroad's future has to stay and be upgraded, right? Right.

We have 14.6 miles from Colehour Junction to Union Station, used mostly by Amtrak. It has to go, right? Wrong.

The 44.4-mile old Michigan Central line from East Gary, Ind., to Joliet, Ill., has an inefficient labor situation, few siding patrons, and few trains. It has to go, right? Wrong.

The 200-mile Kankakee Belt Route from South Bend, Ind., to Zearing, Ill., gives us the long haul on freight for western connections and runs more than 50 miles to the south of Chicago, so we use it often. We keep it, right? Wrong again.

HOW'S THAT?

On those last three examples it would seem that we are denying all the basics about what to keep and what to dump, but we are not. The idea is to start with the shape of the future. (Some cynics add "if any," but we'll stay optimistic and assume a future based on free enterprise.)

So the criterion is not what is or what has been, but what must be in years to come. A previous generation put a key classification yard at Elkhart, Ind. — 100 miles out of Chicago — for reasons we may assume were good when the decision was made. In those days, though, the current technology was loose-car railroading. If there is to be a future, it must encompass *trains*, not *cars* — container trains with fixed consists on fixed routes and schedules, integral bulk trains carrying trainloads to specific patrons.

The classification yard and all it symbolizes must go. The new technology will use truck-rail interfaces for general cargo which will be carried in containers on general-purpose cars. Bulk trains will run direct. The capacity of a track is enormous when trains keep moving.

BACK TO CHICAGO

The passenger line is grade-separated all the way from the probable location of a Chicago container terminal near Colehour across the South Side to key connections. The route is short, fast, and direct, and it permits nonstop movement through "the jungle" where a standing train is apt to be looted.

This route offers connections to the Burlington Northern and the Milwaukee Road, and a connection to the North Western could be provided easily. Little or no involvement with the hostile surroundings would be necessary. This is not true of all routes in the area because all are not grade-separated as PC is.

On this route our trains could run from the East to the near-north-side road-rail interfaces which would be convenient to the expressways and close to downtown. Despite myths, in this day of costly trucking there still are advantages in having a convenient central location.

Now consider the MC line. It is almost 50 miles long and connects with all southern and western lines except the Burlington. It can be lined with container facilities and still have large running capacity — *for integral trains.* Its location can be strategic — it is beyond the "jungle" but 30 miles closer to the commercial city than is the Kankakee Belt.

That 30 miles can be turned into lower drayage cost and thus higher rail revenue; even 30 miles can cost $40 to $50 a round trip. The MC line can offer interface sites in Indiana and in two Illinois counties. That is important because the fiefdoms of local truck jockeys are cut up along county lines and competition is good for their souls too.

BUT THE "KKK"

The Kankakee Belt comprises 200 miles of rural line which is parallel to other routes and an unnecessary 30 miles farther away from the Chicago-area customers than the MC. Should the Kankakee Belt be kept for the long haul? That would be money wasted for redundant track and a redundant haul just to cater to an obsolete division formula. Is it good to keep through traffic out of town? If you keep the trains moving, there is no capacity problem.

The "conventional wisdom" has transport routes bypassing the cities. The fact is that transport has to go where the patrons are, and they are in the cities.

RATIONALIZATION

Look once more at the map. The suggested retentions permit Penn Central to operate a minimum plant, eliminate a lot of track (much of it not shown), and still have direct access to connections as well as space for conveniently located rail-road transfer points. There is no point to maintaining the circuitous, duplicating lines far from the city, such as the Kankakee Belt and the Indiana Harbor Belt. "Straight across" is shorter than "out around," and part of the advantage of the railroad is that it can make good use of a modest right of way while a highway cannot afford its wide swath "straight across."

Yard space is not at issue — the whole yard technology has to go. The rail freight station of the future must be an interface. It must be a place where containers move quickly between cars and trucks.

No one makes money on freight that stands still.

NEW YORK, TOO

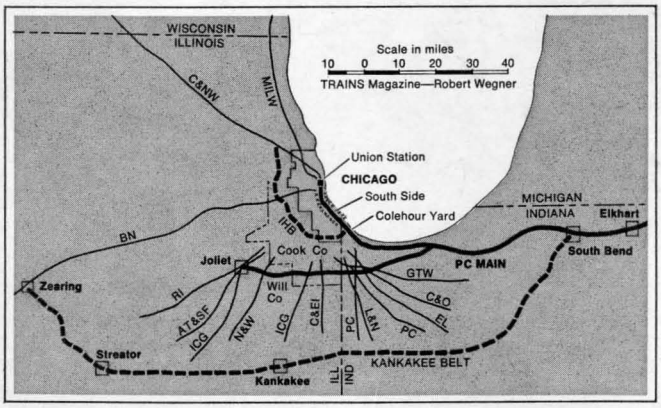
Similar conditions exist elsewhere — in New York, for instance. "Conventional wisdom" says sell the railroad tunnels to a public agency and run the freight far around the city; but the best idea is to let public agencies build new tunnels — they want to do so anyway — and keep the New York tunnels for a direct freight line for next-generation trains. The tunnels don't have to be electrified, incidentally. Diesels can be used in them (and are).

Western cargo destined for Long Island incurs a serious disability if it has to be drayed from New Jersey — and the Jersey traffic gets the same reduced rate. But with stations on both sides of the city, costly truck miles are avoided and the railroad gets more money.

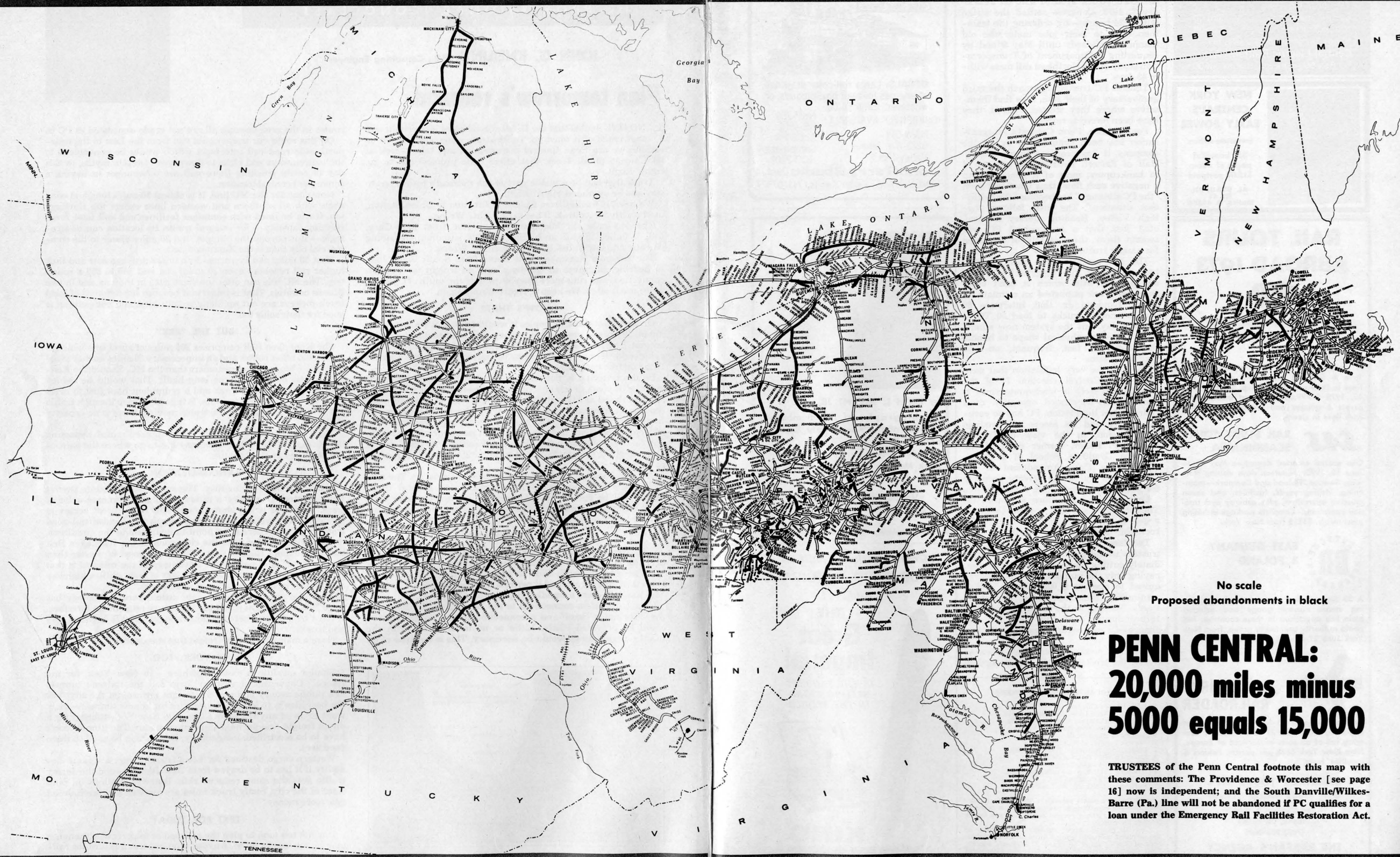
TEXT FOR TODAY

It is not too soon to plan the railroad of tomorrow, although it may be too late to do so. Anyone who expects a future for railroads must get on with the job.

The process is not automatic. I



TOMORROW'S rail map of PC around Chicago should be different.



No scale
Proposed abandonments in black

PENN CENTRAL: 20,000 miles minus 5000 equals 15,000

TRUSTEES of the Penn Central footnote this map with these comments: The Providence & Worcester [see page 16] now is independent; and the South Danville/Wilkes-Barre (Pa.) line will not be abandoned if PC qualifies for a loan under the Emergency Rail Facilities Restoration Act.

Continued from page 4

After the new rules finally were posted, the UTU struck at 12:01 a.m. on February 8, 1973. Congress settled the strike within 24 hours — by ordering the trainmen back to their jobs under the old manning standards until May 9 and by requesting a Department of Transportation study of the Northeast rail mess within 45 days.

Thus as PC trustees approach the third anniversary of their jobs, they find themselves where they started. Indeed, they have been forced to retreat.

For instance, Penn Central's reorganization has been complicated by all the company it has acquired in its misery. Half of Eastern District rail mileage is in bankruptcy, most of it running with a negative cash flow; thus what had been "the PC situation" has become "the Northeast situation." The little fellows (Lehigh Valley, Reading, Jersey Central, etc.) fear that a reorganized PC will swamp them; there is talk of the need for a super trustee.

The one positive force Penn Central has going for it — piggyback — is the one service with which it can't cope. *Business Week* published an estimate by Jervis Langdon Jr. that Interstate 80 carries enough trucks to load 50 TOFC trains a day, but the system now admits that it is in no physical shape to handle the strain of fast, frequent, on-time piggyback runs.

Further, the very legislation that governs Penn Central (Section 77 of the Bankruptcy Act) is inadequate since it contemplates continued operation of a railroad, not liquidation. PC has no earning power and its assets are eroding. This erosion, in the view of Trustee George P. Baker, former dean of the Harvard Graduate School of Business, violates the Fifth Amendment of the Constitution by taking private property for public use without due compensation.

Options and nonoptions surround us. They reflect variously committee-think, a get-tough stance, Nixon policy, don't-rock-the-boat, and what-is-politic:

TRUSTEES' FIRST CHOICE — Clearly the trustees would like to go it alone, immediately cutting the system to 11,000 miles, paying only the number of employees required to operate 11,000 miles, and discontinuing noncompensated passenger trains. Nothing in the track record since 1970 indicates that this plan has the chance of a man with luggage in a Tokyo subway.

TRUSTEES' SECOND CHOICE — Alternatively, the trustees would cut the system

HEADQUARTERS QUIZ ANSWERS

1. Rock Island; Chicago, Ill.
2. Seaboard Coast Line; Jacksonville, Fla.
3. Florida East Coast; St. Augustine, Fla.
4. Norfolk & Western; Roanoke, Va.
5. Santa Fe; Chicago, Ill.
6. Norfolk Southern; Raleigh, N. C.
7. Louisville & Nashville; Louisville, Ky.
8. Union Pacific; Omaha, Nebr.
9. Clinchfield; Erwin, Tenn.
10. Southern Pacific; San Francisco, Calif.
11. Southern; Washington, D. C.
12. Burlington Northern; St. Paul, Minn.

SCORING (24 points possible): We reckon 15 correct answers constitute a passing grade; a score of 20 is excellent; and a perfect score puts you out in front of the editors.

P.S.: All photos appear through the courtesy of the involved railroads, except those of the headquarters of Rock Island (Edward J. Wojtas), Florida East Coast (Charles K. Marsh Jr.), and Clinchfield (TRAINS: J. David Ingles).

R. J. Sandusky.

NEW LIFE: United Railway Supply of Montreal is rebuilding a number of Chihuahua-Pacific's 30 bought-new Fairbanks-Morse H16-44's. Units retain OP engines and former short hoods (high or low). Nos. 513 and 525 of the Mexican road are shown at the URS shop with ex-D&H RS3's 4117 and 4129.

J. C. Smith Jr.

EASY, ELIZABETH: Wearing Amtrak digits and PC paint, GG1 907 takes a Philadelphia-bound Amtrak "clocker" past new fill and catenary poles at Elizabeth, N. J. The construction will allow better superelevation of track and thus ease (but not eliminate) a speed-restricting reverse curve.

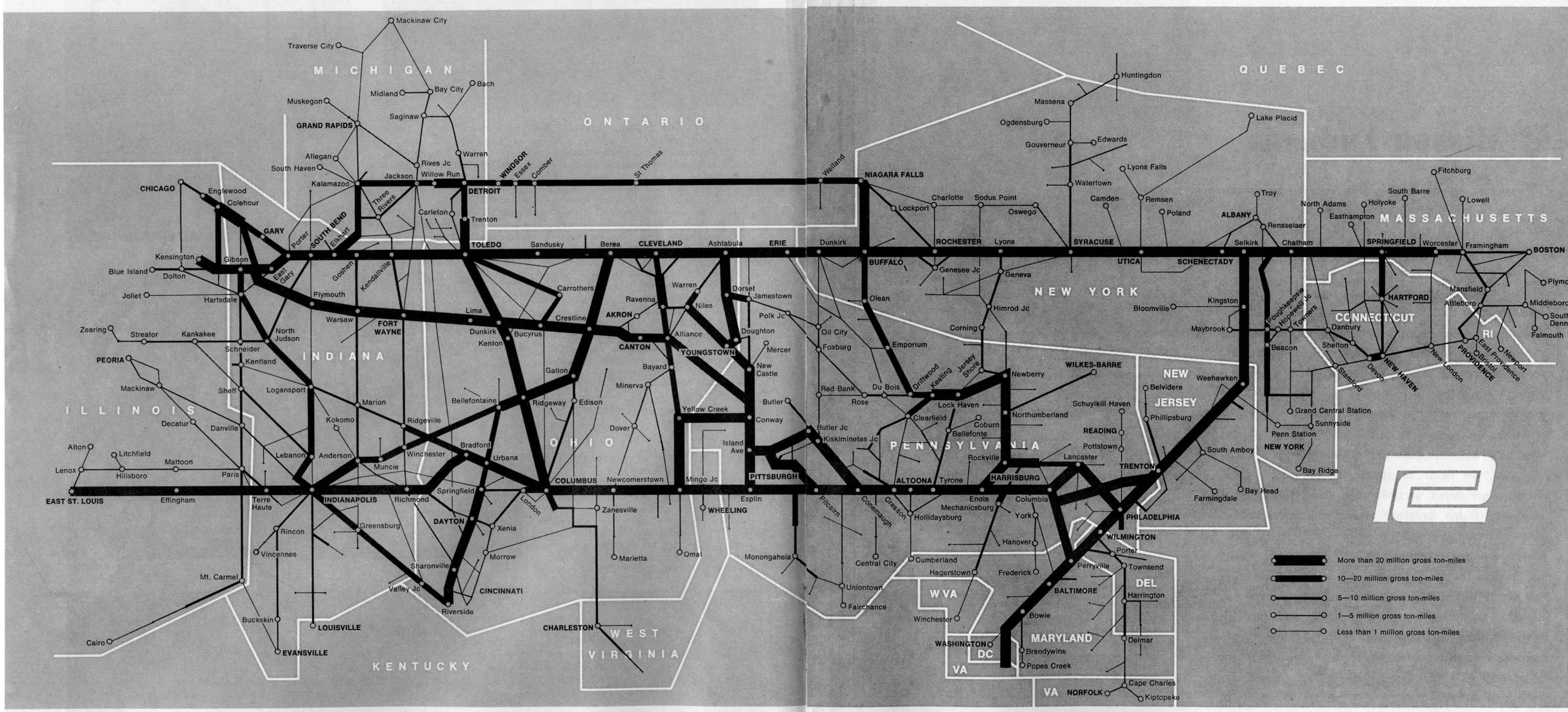
LONG INTERVAL: Four Boston & Maine RDC's chartered by the Massachusetts Bay Railroad Enthusiasts idle beside Providence & Worcester RS3's on June 24, 1973, as riders tour the P&W shop at Worcester, Mass. The special, which made a round trip from Boston to East Providence, R. I., was billed as "the first P&W passenger train since 1888."

Scott A. Hartley.

THE DEVIL MADE ME DO IT: One incident marred the return of Steamtown USA's ex-Nickel Plate 2-8-4 No. 759 to excursion service on July 22, 1973 — she stalled on the 1.73 per cent grade at Devil's Hole, Pa. After she had made three unsuccessful attempts at starting, two GP7's were called to the rescue. The 19-car High Iron Company special made the one-day Hoboken-Scranton round trip over Erie Lackawanna.

John R. Taibi.

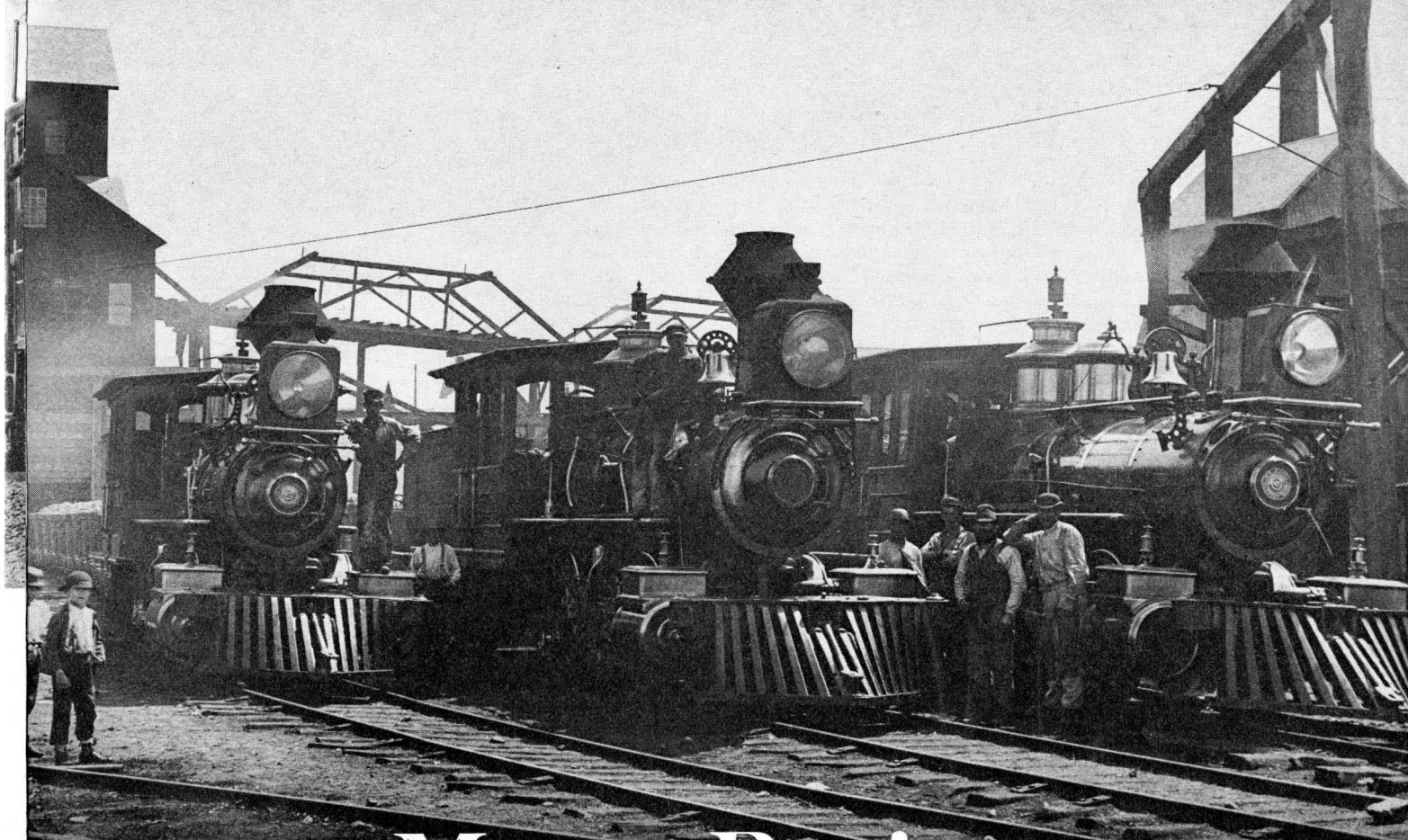
How much moves where on Penn Central



A GEOGRAPHICAL MAP of a railroad tells you where the rails go without revealing why. A traffic-density map shows how many tons a railroad hauls where — *i.e.*, explains its reason for being; or, frequently in the context of Eastern railroading in 1973, its reason for not being. This Penn Central map, revised on March 27, 1973, is a key exhibit in current Congressional deliberations on how to rationalize excess rail fixed plant. A cursory glance confirms the obvious: PC's main lines are its strength — both its east-west stalwarts from New York to Chicago and St. Louis and its key north-south links such as those between Toledo and Columbus, O., and between Ashtabula, O., and Pittsburgh. But away from the mains, tonnage shrinks — as in northern Michigan, northern New York, almost all of Pennsylvania, and throughout New England. The map poses one question: Where do the authors of that passenger-only Northeast Corridor system propose to divert all the New York-Washington tonnage in areas where PC maintains no freight bypass routes? Item: The paucity of traffic over much of Penn Central, so vividly portrayed here, is worrisome. Still, this density map reaffirms what a productive, useful transportation plant PC *is* where traffic swells sufficiently to promote the mass transportation which underwrites profitable railroading. Add up the mileage of those "more than 20 million gross ton-mile" mains, and you have a powerful argument *for* railroading in the East — self-respecting railroading. — D. P. M.

Missouri mixeds

IN its last decade the Wabash Railroad was much the same west of the Mississippi River as it was east of Ole Man River — with two notable exceptions. The Columbia mixed was the archetypal branchline accommodation. The local switcher dragged a baggage car and a coach (stove-heated, of course) up to Centralia to meet the mainline passenger trains, accomplishing local freight and switching duties en route and performing chores at each end during layovers. The operation lasted well beyond the 1950's (when a little EMD SW1 or the pictured Lima-Hamilton diesel did the honors) into the Geep era — even to the time when the GP7 would be ex-Nickel Plate and lettered NORFOLK & WESTERN. After the exotic motive power disappeared, we came to appreciate the scenic — the ornate stone depot at Columbia; the typically Wabash gray frame structure at Hallsville; the rolling Boone County countryside; indeed, even the very existence of the trains. All this despite the fact that the "Follow the Flag" banner was lowered forever in October 1964. The St. Louis-Council Bluffs run was another kind of mixed — a passenger train with through freight added. Tonnage behind the head-end cars and coach improved freight service (doubled it on the Brunswick [Mo.]-Council Bluffs portion) and also prolonged the life of the passenger accommodation. Nos. 211 and 214 ran on leisurely schedules and up front had about anything you wanted except an FM Train Master in the way of road diesels — from E8's to Geeps to F7's, even a PA on occasion. The Wabash of the early 1960's in Missouri — a common man's railroad in commonfolk country, with a couple of uncommon trains. — J.D.I.



Mason Bogies, 3-per-cent-plus grades, a compound, an odd gauge, Camelbacks . . .

. . . What more could anyone ask?

STANLEY H. MAILER

IN NORTHERN MICHIGAN'S Copper Country is a starred land in the annals of railroad history. Picture a place where Mason Bogies, Camelbacks, and a lone Vauclain compound battled grades of over 3 per cent — all on a gauge of 4′ 1″. Add to this scene the five examples of textile machinery manufacturer William Mason's handiwork which lasted until 1942, and you begin the tale of Hecla & Torch Lake Railroad.

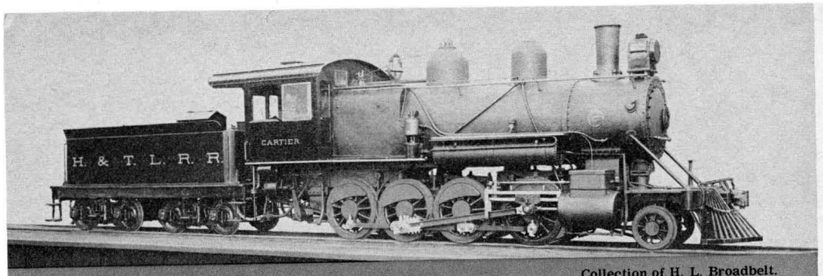
WHEN Horatio Alger wrote about the land of Keweenaw, that conspicuous thumb of Michigan jutting into Lake Superior, the copper-mining boom was just beginning. Primitive mass copper mines — from which 98 per cent pure copper was wrestled from the rock strata — predominated. By 1864, one Edwin J. Hulbert, prospector and copper man, had stumbled upon the greatest copper strike in the nation's history: the Calumet Conglomerate. The result was a princely mining property, the Calumet & Hecla Consolidated Copper Company.

C&H became immensely wealthy almost overnight. Within five years of the strike, the mines around Calumet accounted for more than 65 per cent of northern Michigan copper

Continued on page 32

MASON BOGIES pose at Calumet, Mich., about 1880 in a photo from the Collection of John T. Reeder.

HARDY MINERS of the north country — employees of Calumet & Hecla Consolidated Copper Co. — stand for their portrait at the Calumet (Mich.) headquarters in a photo from the Collection of John T. Reeder. The five locomotives are too grimy for us to discern their lettering for the company's Hecla & Torch Lake Railroad, but they reasonably can be identified from left as: Manitou, a 2-8-0 rebuilt from a Camelback; Penokee, a 2-8-2T for whose wheel arrangement the name Calumet was coined; a small Mason Bogie — possibly Torch Lake, which still exists and hauls tourists; and St. Louis and Schoolcraft (or vice versa), two identical larger Mason Bogies. The date: about 1903, some four years before completion of the conversion of the 4′ 1″-gauge network to standard gauge.



Collection of H. L. Broadbelt.

POWER OF CALUMET & HECLA

STEAM

NAME	ROAD NUMBER	TYPE	BUILDER	DATE BUILT	BUILDER NUMBER	DATE SCRAPPED	NOTES
Fluke	----	0-4-0	?	1867	?	?	(1)
Hecla (1st)	1 (1st)	0-6-0	Mason	1868	292	1887	
Calumet (1st)	2 (1st)	0-6-4T	Mason	1872	457	1887	
Torch Lake	3 (1st)	0-6-4T	Mason	1873	518		(2)
Red Jacket	4 (1st)	0-6-4T	Mason	1880	622	1942	
Raymbault	5	0-6-4T	Mason	1882	681	1942	
Kitchigami	6	2-8-0	Baldwin	1885	7709	1944	(3)
Manitou	7	2-8-0	Baldwin	1886	8199	1945	(3)
Schoolcraft	9	0-6-4T	Mason	1887	747	1942	
St. Louis	8	0-6-4T	Mason	1887	748	1942	
Allouez	10	2-6-2T	Baldwin	1896	14793	1942	
Ishpeming	11	2-6-2T	Baldwin	1896	14794	1942	
Montreal	12	0-6-0T	Porter	1899	2058	1920	
Voyageur	13	2-8-0	Baldwin	1900	17458	1944	(4)
Bête Gris	14	2-6-2T	Porter	1901	2424	1920	
Penokee	15	2-8-2T	Baldwin	1902	20163	1944	(5)
Roberval	8 (2nd)	2-8-2T	Baldwin	1907	32200	1944	
Cartier	7 (2nd)	2-8-0	Baldwin	1907	32201	1944	
Champlain	9 (2nd)	2-8-2T	Baldwin	1907	32223	1955	
Calumet (2nd)	1 (2nd)	2-8-0	Alco-Brooks	1910	48369	1944	(6)
Hecla (2nd)	2 (2nd)	2-8-0	Alco-Brooks	1910	48364	1944	(6)
Keweenaw	3 (2nd)	2-6-0	Alco	1929	68039	1944	
Osceola	4 (2nd)	0-6-0	Baldwin	1929	60899	1955	

NOTES

(1) Upright-boilered locomotive.
(2) Donated in 1969 to Henry Ford Museum, Dearborn, Mich., and converted to oil-burner. Operates in summer months for tourists on ¾-mile segment of track at adjacent Greenfield Village.
(3) Built as wide-firebox center-cab (Camelback) locomotives; later rebuilt with Belpaire boilers and rear cabs. **Manitou** acquired a second road number (probably 6).
(4) Acquired a second road number (probably 5).
(5) Acquired a second road number (10).
(6) **Calumet** and **Hecla** were built as Mineral Range Railroad Nos. 199 and 194 respectively and were purchased by C&H in 1925.

Assignment of second road numbers about 1940 is not entirely clear because road numbers were not prominently displayed on C&H locomotives.

C&H locomotives built during and after 1907 were built as standard-gauge; all units except **Montreal** and **Bête Gris** remaining on the roster at that date were converted from their constructed gauge of 4′ 1″ to standard gauge.

DIESEL

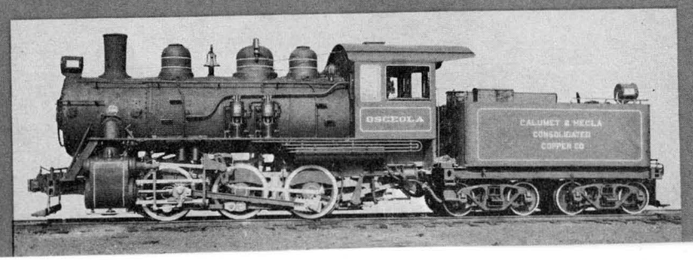
ROAD NUMBER	MODEL	BUILDER	DATE BUILT	BUILDER NUMBER	NOTES
201	DS44-1000	Baldwin	1948	73956	(1)
202	DS44-1000	Baldwin	1948	73957	(1)
203	S-12	Baldwin-Lima-Hamilton	1951	75141	(2)
204	DS44-1000	Baldwin	1950	74777	(3)
205	RS1	Alco	1951	79577	(4)
206	RS1	Alco	1951	79578	(4)
210	70-ton	General Electric	1946	28566	(5)
211	45-ton	General Electric	1943	17854	(6)

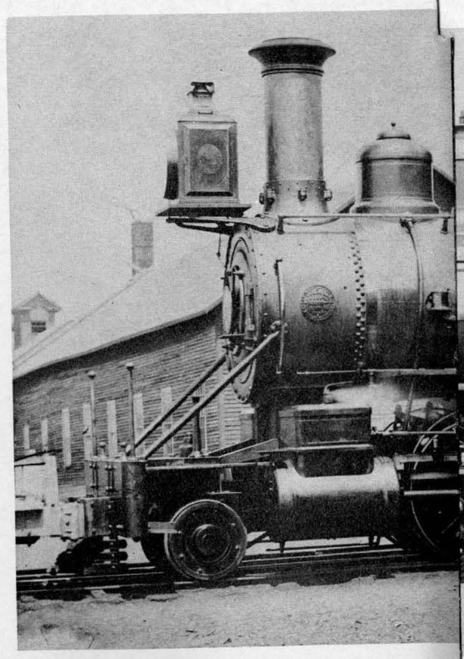
NOTES

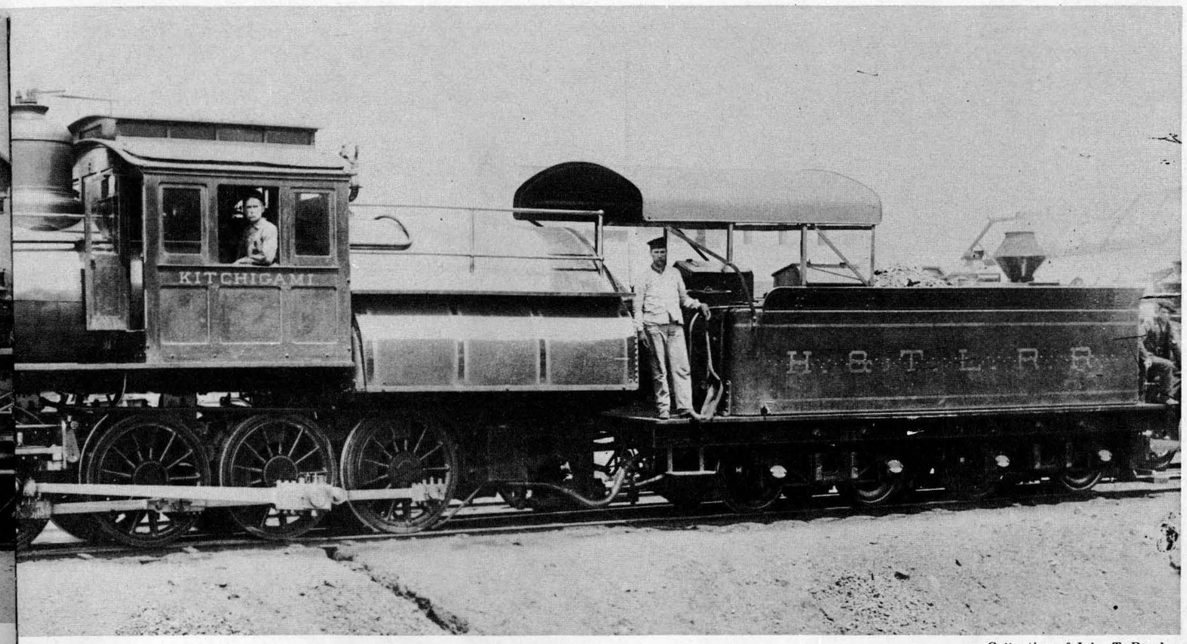
(1) Sold to Escanaba & Lake Superior Railroad for service, 1971 (same road numbers).
(2) Dismantled for C&H by Keweenaw Central Railroad tourist line; parts sold to E&LS, 1971, along with intact locomotives.
(3) Originally U. S. Corps of Engineers (Garrison Dam Project) No. L-4; purchased by C&H, 1964; sold to E&LS for service, 1971 (same road number).
(4) Nos. 205 and 206 originally Lake Superior & Ishpeming 1002 and 1003 respectively; purchased by C&H, 1967.
(5) Sold to Marquette & Huron Mountain Railroad, May 1972.
(6) Sold to Goodman Lumber Division, Goodman, Wis., 1967.

C&H also operated several narrow-gauge Plymouth diesel-mechanicdl locomotives for intraplant use.

Collection of H. L. Broadbelt.







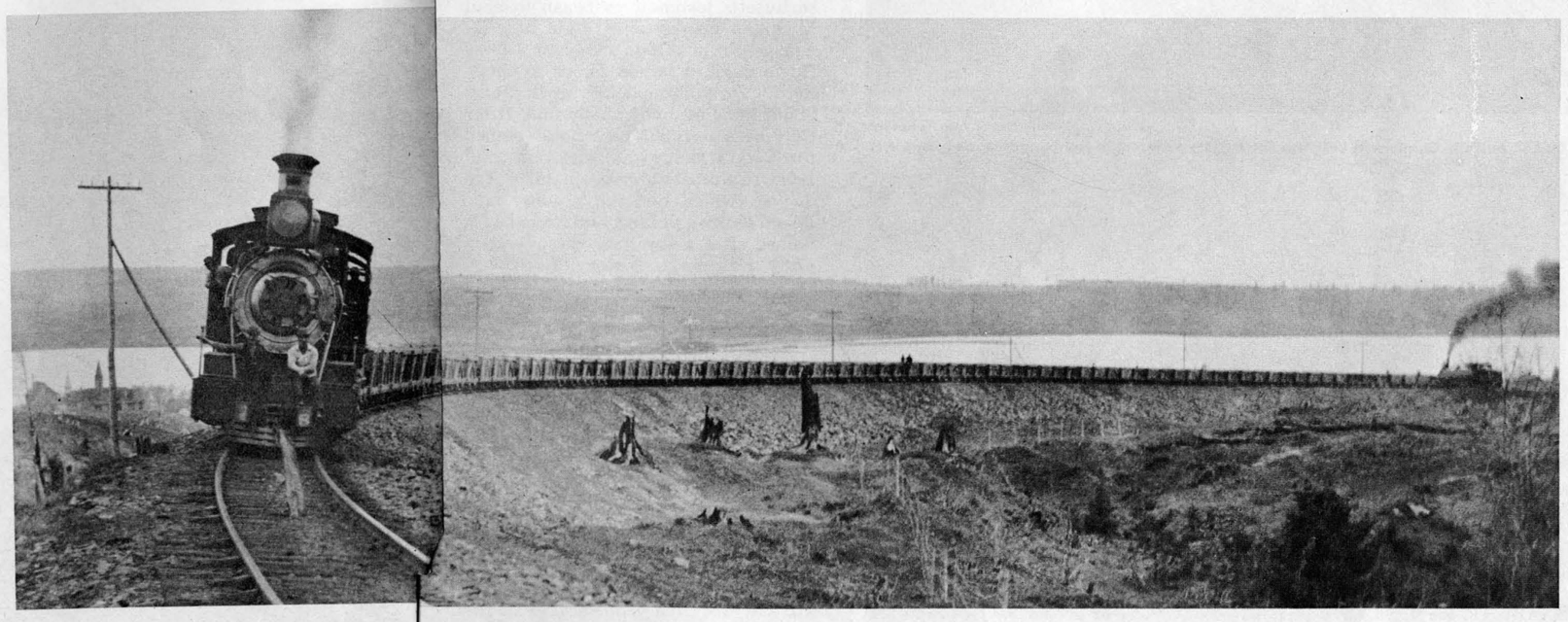
Collection of John T. Reeder.

KITCHIGAMI was built by Baldwin in 1885 as a 4′ 1″-gauge Camelback. Later C&H rebuilt her with a Belpaire boiler and a conventional cab and also standard-gauged her.

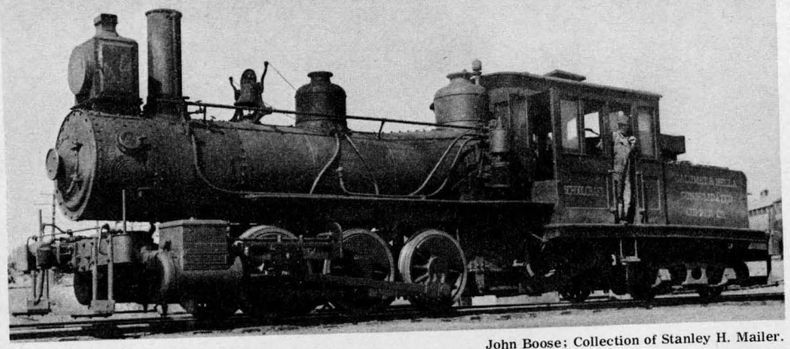
production, some 16.2 million pounds. Nurtured carefully by Boston capital, the property became a planned, fully supplied mining community. Financial affairs were firmly in the hands of Boston Brahmins Quincy Adams Shaw and Henry Lee Higginson, with management entrusted to Alexander Agassiz, son of noted Swiss geographer Louis Agassiz.

Not surprisingly, C&H needed a railroad to carry off the phenomenal wealth from minehead. Hecla & Torch Lake Railroad was organized by the mining company in June 1867 and completed 4 miles of track by October 1868. The first locomotive, an upright-boiler affair named *Fluke*, may have been the reason for the odd gauge. Stories have it that the small four-wheeled engine was built to the 4′ 1″ width by mistake; upon its delivery the mining railroad company decided in favor of the locomotive and built the railroad to fit.

When the line opened, the first Mason had come ashore. Mind you, the H&TL connected with no other railroad, so the Massachusetts-built locomotives were shipped up the Great Lakes to the isolated mining region. The first of these engines was an 0-6-0 named *Hecla*, a conventional type of locomotive which trailed a less conventional four-wheeled tender. The first Bogie-type engine, *Calumet*, was built and was shipped in 1872. H&TL named the first locomotives after the mines which had brought the engines to the north country. *Calumet* ushered in the era of the swiveling engine frame, making Mr. Agassiz's railroad one of the first in the Midwest to use Bogies.

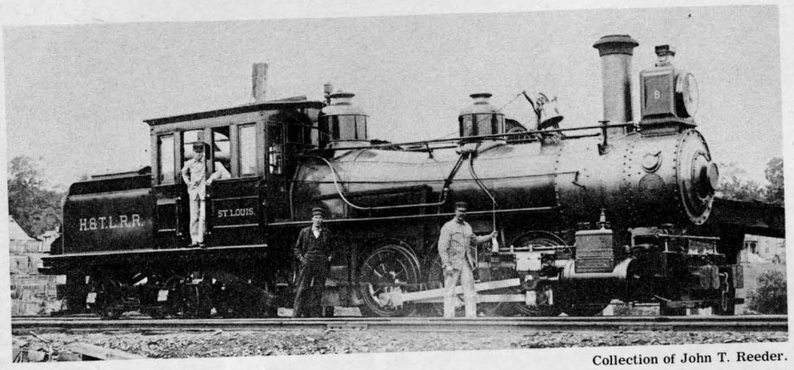


THE PHOTOGRAPHER posed a train of empties — with Manitou on the point and a Mason on the rear — on the grade up to Calumet around 1890. In the background is Torch Lake.



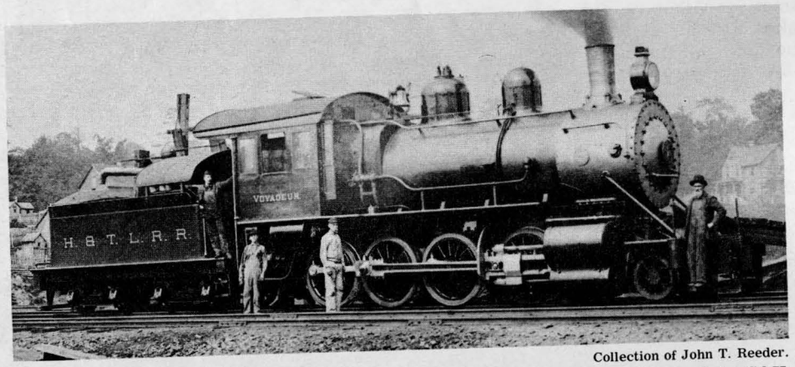
John Boose; Collection of Stanley H. Mailer.

SCHOOLCRAFT still served the smelter at Hubbell, Mich., on Torch Lake in August 1939.



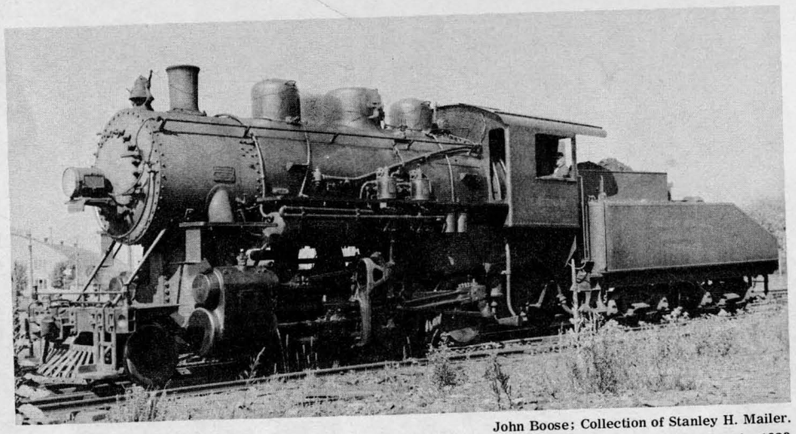
Collection of John T. Reeder.

ST. LOUIS and her crew pose at Incline Station. The engine was among the last Masons built.



Collection of John T. Reeder.

VOYAGEUR, built by Baldwin in 1900, was the only experiment in compounding made by C&H.



John Boose; Collection of Stanley H. Mailer.

KEWEENAW, an 83-ton Mogul, was 10 years old when she posed for her photo at Calumet in 1939.

The Mason-Fairlie patent, or Mason Bogie, was a product of Yankee ingenuity and a bit of Irish experience. Some years earlier, Robert F. Fairlie, locomotive superintendent of the Emerald Isle's Londonderry & Coleraine Railroad, had worked on a problem. Fairlie wanted a locomotive to fit the restrictions of his railroad but with ample firebox dimensions. The narrow fireboxes of the day normally rode between the main frames, which limited grate area. His solution was to locate the firebox between two trucks, thus freeing it from the frame's incarceration. At first both trucks were designed as driving wheelbases, but a later type employed one driving truck and one conventional truck under an attached tender. The Fairlie design that later came to the attention of William Mason had a single driving wheelbase secured to the boiler. Mason reflected that for use on American railroads, which were rough and sharp of curvature, it would be wise to have a pivoting driving frame which would negotiate primitive track with comparative ease. The resulting product proved to be a successful design; Masons were cited as being a good bit more powerful than engines of comparative weight and cylinder dimensions.

H&TL's aloofness and its penchant for distinction led to its matching the unusual Bogie locomotive to the dray-horse needs of mining. Since C&H's backers were in Boston, and since locomotives were needed, William Mason and his neighboring Taunton (Mass.) machine works became part of H&TL's world. And Massachusetts locomotives began to haul Michigan copper with style and elegance. From 1872 to 1882 four 0-6-4T Bogie engines joined forces to shepherd 2½-ton-capacity rock cars about minehead and stamp mill. After *Calumet*'s arrival, *Torch Lake* (named for C&H's stamp-mill site and inlet below Calumet) arrived in 1873; *Red Jacket*, which honored a new mine near Calumet, in 1880; and *Raymbault*, named after a voyageur-discoverer of early Keweenaw history, in 1882.

THE NARROW GAUGE had two segments in those times. The 5-mile line from the shaft houses at Calumet ended at the edge of a plateau. A mile below the flatlands lay Torch Lake, an arm of Lake Superior and site of the C&H's concentrating mills. The drop was considered to be too steep for a conventional railway, so H&TL built a gravity system which lowered the cars via cable from Incline Station to the waiting rock bins. The incline functioned for the railroad's first 19 years. By 1885 C&H had opted for a new railway down the mountain. With it came a different answer to the motive power question: Camelbacks.

Collection of John T. Reeder.

TRACK still was 4' 1" gauge in the 1890's when Camelback Manitou and an older Mason (in background) stood for their portrait near Calumet. The rock cars had a capacity of 4 tons.

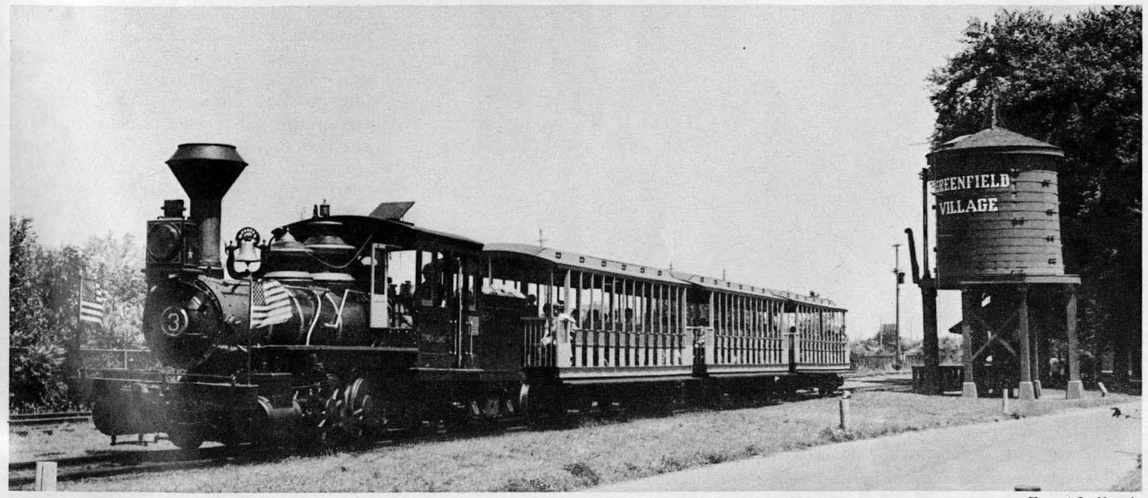
Wootten's anthracite-burners were right at home in eastern Pennsylvania on the Philadelphia & Reading. The wide double-door firebox was beginning to be a matter of course in hard-coal country, but in northern Michigan the application was novel. *Kitchigami* and *Manitou*, twin Baldwin 2-8-0's, came to the copper country a year apart and sent thin plumes into the sky above the new but formidable grade. *Manitou* weighed 90 tons, while friendly Indian sister "*Kitchi*" tipped the scale at a more graceful 85 tons. Each had a special fireman's shelter over the coal area to ward off the merciless Lake Superior winds, and both engines were equipped with special smokebox-front draft regulators, which controlled burning rates of the anthracite fuel. Both of these engines served as Camelbacks until around 1900, when they were rebuilt with Belpaire boilers and rear cabs. *Voyageur*, a lone Vauclain compound Consolidation nearly identical to the Camels in weight, began working the copper trains in 1900. The compound's boiler must have been a big success because two duplicates from Baldwin showed up to replace the Wootten anthracite designs of *Kitchigami* and *Manitou*. H&TL thus became a bit more conventional after the metamorphosis of the center-cab engines.

Mason, nearly at the end of his great locomotive-building career, was not ignored by C&H after the new railroad was built; two large 0-6-4T Bogies left his Massachusetts works in 1887. (Mason built just six more locomotives before the order books were closed forever.) *Schoolcraft* (named for pioneer Michigan statesman Henry Schoolcraft) and *St. Louis* were long, stately twins which served into an age disconnected from Bay State steam construction. *Schoolcraft* could be seen puttering about the C&H works at Hubbell on the eve of World War II, aloof and unaffected by times and toil.

During the 1890's the copper king experimented with a succession of large and small sidetank engines. *Allouez* and *Ishpeming*, high-drivered (for H&TL) 2-6-2T designs, bustled about the surface works which steadily were enlarged. Dubbed "the passenger engines," the first tankers resembled contemporary exports for Japan's Nippon Railway. Porter built two small six-coupled sidetankers for smelter service — *Bête Gris* and *Montreal* — in 1899 and 1901 respectively. Both disappeared from the roster decades ago.

Intrigued with the packaged locomotive, the roster assemblers of Calumet in the first decade of the 20th

AN ACTIVE MASON: Torch Lake, converted to an oil burner, now performs for tourists on a ¾-mile stretch of track at Greenfield Village adjacent to Henry Ford Museum in Dearborn.



Ernest L. Novak.

century moved into another design which incorporated many tried and apparently true ideas. The successful *Voyageur* design, crossbred with the sidetankers, produced a pioneer 2-8-2T, *Penokee*. The idea must have been different enough to cause some commotion in the railroad world, for printed sources refer to the engine as the Calumet type. The 51-inch-drivered little giant was built on the eve of both standard-gauging and a big roundhouse fire which damaged many of the older engines. Baldwin duplicated the Calumet type twice for H&TL in standard gauge in 1907, along with building a Consolidation named *Cartier*. The 2-8-0 was conspicuous in its normal appearance, as though the north country had tired of being a bit different. The two Calumets, *Roberval* and *Champlain*, along with *Cartier*, were the last new engines to bear the road's initials — in 1907.

STANDARD-GAUGING came arm-in-arm with other improvements. Until 1899 there was only narrow-gauge trackage north of Hancock, 10 miles away. A 3-foot-gauge line connected Calumet with the railways of the outside world as early as 1873, and a second 3-footer, built in the 1880's, was a second connection. By the turn of the century the switch to standard gauge on these connections was under way, and Calumet & Hecla wanted full-width status. Regauging was a piecemeal affair, but by 1906 most of the changes had been made.

By all rights the little Masons should have been retired. Yet the copper giant decided to rebuild all the Bogies to standard gauge even after many had been badly damaged in the roundhouse fire. They emerged from shopping to serve for many more years.

The history of the Calumet & Hecla was marred by a great strike in 1913, by the exodus of hundreds of Copper Country families to less harsh climates, and in the dissolution of the Hecla & Torch Lake Railroad's name. The railroad carried on much as before, but after 1913 the locomotives were stenciled with the full corporate name of the parent firm: Calumet & Hecla Consolidated Copper Co.

In 1925, C&H acquired two large Alco Consolidations from defunct neighbor Mineral Range Railroad, from which C&H had withdrawn financial support. (Half owned by C&H, Mineral Range's empire died nearly overnight.) C&H built a 4-million-dollar, 9½-mile line from Lake Linden to Ahmeek, which was a more efficient connection for the newly acquired mining properties north of Calumet. The new railroad was completed by 1925.

C&H's last two steam locomotives arrived on the eve of Black Tuesday in 1929. A Baldwin 0-6-0, *Osceola*, and an Alco 2-6-0, *Keweenaw*, came to fill the stalls beside the still present and faithful Masons, many of which slept their last sleep in the iron-linteled stone roundhouse at Calumet. In keeping with tradition, *Keweenaw* was a bit different: she weighed 83 tons and may have been the last domestic 2-6-0. Both burly and high over her drivers, *Keweenaw* was still shiny as the nation moved into the depression.

The scene at Calumet in the mid-Thirties must have been esoteric. C&H held the Masons, the ex-Camelbacks, the former compound, and all the strange others with little thought of ridding itself of excess baggage. Some of the Masons stirred and went to work — *Schoolcraft* was one, complete with oil headlight and weblike bell bracket. Five of the Masons still existed: *Torch Lake*, *Red Jacket*, *Raymbault*, *Schoolcraft*, and *St. Louis*. Only after many of what must have been sentimental years did the view change. During World War II, thousands of tons of surplus machinery was scrapped, and only then did the Masons go.

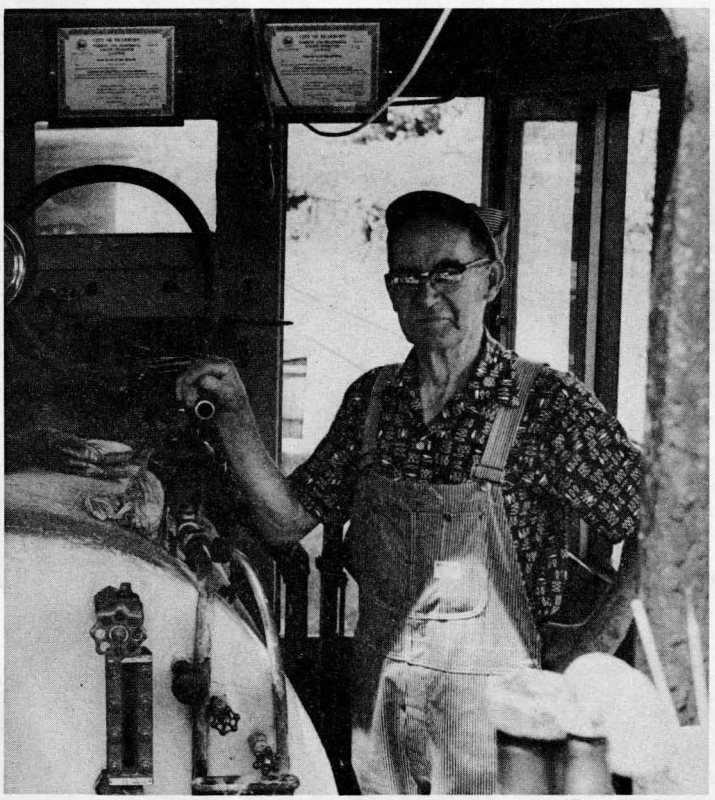
That is, all save one.

THE AFTERMATH of VJ-Day brought an influx of diesels to C&H — 1000 h.p. and 1200 h.p. Baldwins and 70-ton General Electrics. *Osceola* and *Champlain*, by then numbered 4 and 9, were held until 1955. After *Osceola* saw one last brief fling in the winter of 1954-1955, but one steam survivor remained: the storied *Torch Lake* — the last Mason Bogie.

Back in the 1920's, the Keweenaw Central Railway, which ran north from Calumet, had quit operations. Somehow *Torch Lake* had been borrowed and then abandoned by KC, and a C&H crew was sent to run the locomotive back to civilization. Later, *Torch Lake* was offered to the Smithsonian Institution, which reportedly replied that it was unable to accept the gift, so the 1873 Mason slept for long years — about 40 — disturbed only by the curious and the informed. She came out for Calumet's centennial in 1964, unfortunately painted in gaudy gold with red trim.

In 1969, *Torch Lake* found a fine new home as the Copper Country lost its last Mason — not to the torch but to the safety of the Henry Ford Museum at Dearborn, Mich. The engine has run in the summer for tourists at adjacent Greenfield Village.

Today the mines of the Copper Country are stilled, perhaps forever. Time has run out for mine and Mason in the north, and even C&H's diesels are being sold off. The closing of the shafts in 1969 signaled the end to an unusual roster of an offbeat railroad in an extraordinary land. I



Ernest L. Novak.

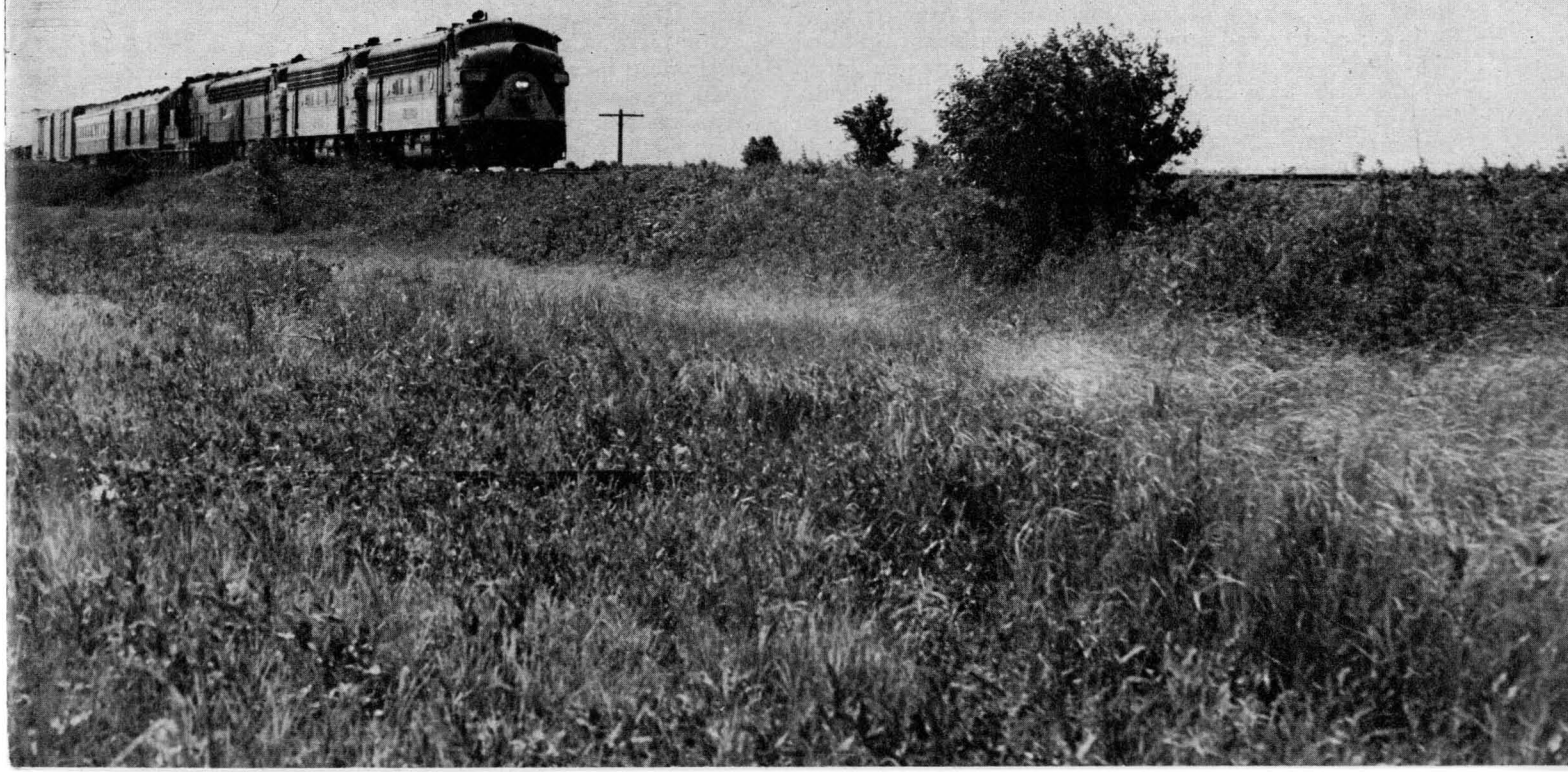
FRANK PETROSKY, retired Michigan Central Detroit Division engineer, is one of four hoggers who run Torch Lake at Greenfield Village.

NO FREIGHT TODAY as Lima-Hamilton switcher 409 ambles into Columbia with a midday "mixed" circa late 1950's.

George Drake.

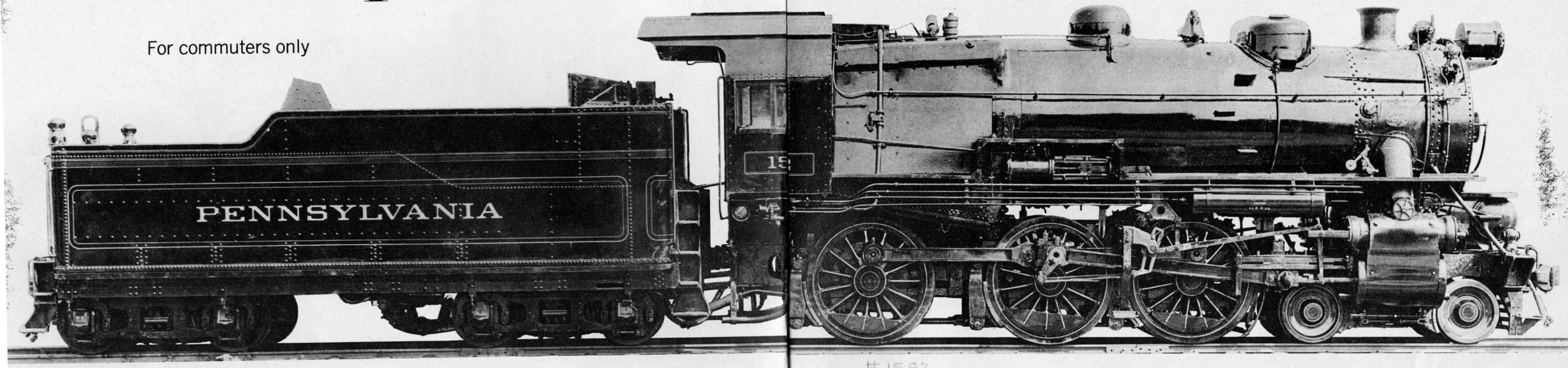
Jim C. Seacrest.

JULY 4, 1965, HOLIDAY means no RPO in the consist of N&W 211 nearing Council Bluffs with about 25 cars.



The mass-production Ten-Wheeler

For commuters only



BERT PENNYPACKER

IN the rugged mountain country and winding river valleys of far western Pennsylvania, the state's namesake railroad once operated a bustling suburban commuter service. Pittsburgh was the hub of a network that stretched in many directions to outlying towns such as Derry, Greensburg, Washington, North Trafford, Sharon, and Beaver Falls.

Certain commuter trains were experiencing scheduling and performance problems in the early 1920's. These problems were especially aggravating in the Pittsburgh area, where ascending gradients at many places severely taxed the capacities of the American and Atlantic types in use. Six-drivered power such as Moguls and G4 Ten-Wheelers were very old designs and no better equipped for the task. Late running was commonplace; the addition of just a single 45-ton P54 coach to a train often meant the difference between on time and late. But schedules could not be speeded up. The situation dictated acquisition of a better locomotive.

Pennsy broke with the traditional policy of downgrading older mainline locomotives for this work. Instead, PRR Mechanical Engineer William F. Kiesel Jr. designed a Ten-Wheeler expressly for heavy commuter duties. The engine became known as Class G5s.

The G5s was America's most powerful Ten-Wheeler and was the last 4-6-0 class to be built for a major railroad. The G5s came more than a decade after the type for all practical purposes had been superseded by the Pacific. Except for unorthodox wide spacing between the second and third sets of drivers (for better weight distribution), the G5s looked like any other standard class of PRR motive power. The usual fat Belpaire boiler was flanked by a bright red and gold-leaf keystone-shaped number plate on the smokebox door and a small steel cab on the backhead. A heavy steel slatted pilot and an air tank (on most G5s's) rode up front. But this commonly recognizable façade was only skin deep, for in the G5s existed an amazing heritage in standard design as well as more unique features than probably were present on any other PRR class.

KIESEL was well schooled in the arts of Belpaires, tender water scoops, and standard design and thus was admirably equipped for his work on the development of the new commuter engine. He had worked under such Pennsy motive power notables as James T. Wallis, who brought forth the famed K4s, and Alfred W. Gibbs, who fathered the E6s. When Axel S. Vogt of D16 fame retired as mechanical engineer in February 1919, Kiesel had been named his successor.

The birth of the new PRR standard class in 1923 was fascinating because of strong hereditary transcendencies from previous classes as well as conservative thinking. Many another railroad at that time in steam history probably would have acquired a Pacific type commuter engine, but PRR considered such a machine an unnecessary extravagance. Gibbs had decreed that each additional pair of wheels cost more money to maintain and operate, and PRR's Pacifics, equipped almost exclusively with 80-inch driving wheels, were considered mainline locomotives (even including the light K2s[a] and K3s classes). With a heavy-duty rock-ballasted roadbed capable of supporting 70,000 pounds or more per axle available, Pennsy's nontrailer-trucked machines usually turned out to be radically big-boilered. (Perhaps the best example of this line of thought concerns the road's fleet of 190 Santa Fe types. Most railroads stayed with the 2-10-2 through the drag freight era, but PRR preferred its gargantuan I1s Decapod, acquiring 598 of them. This included an unprecedented order in 1922 for 475 engines, built by Baldwin at a cost of more than 31 million dollars.)

With these facts in mind, the reasoning of Kiesel in choosing a heavy Ten-Wheeler to handle the commuter power problem becomes obvious. But the choice of a 4-6-0 must have seemed almost like resurrecting a corpse from a grave, because not a single standard class of that type had been built since the last G4's of 1901. The type had seen considerable early usage; classes D (G1) and E (G2) had been included in Alexander Johnston Cassatt's original set of standard classes designed in 1868-1872. But Ten-Wheelers seemed to lose favor near the turn of the century, and no more were built because of the development of superb high-speed Atlantics. The fleet of 4-4-2's eventually numbered 601, and the design culminated in Gibbs' classic E6s.

As the new Ten-Wheeler took shape on Kiesel's drawing board, his selection of a boiler design came to be an even bigger eye-opener than the revival of the wheel arrangement. The basic aim of standard designs was to have complete interchangeability of parts between the various classes and wheel types on the roster. A "part" could be as large as an entire boiler, such as the common one that rode upon the underframes of 425 K4s Pacifics and 574 L1s Mikados. Using this technique of universal boiler application, Kiesel fitted the G5s with a basic design that dated back to 1907 and which already had been used successfully on more than 1100 Consolidations in classes H8, H9, and H10 as well as on the fleet of 83 E6s Atlantics.

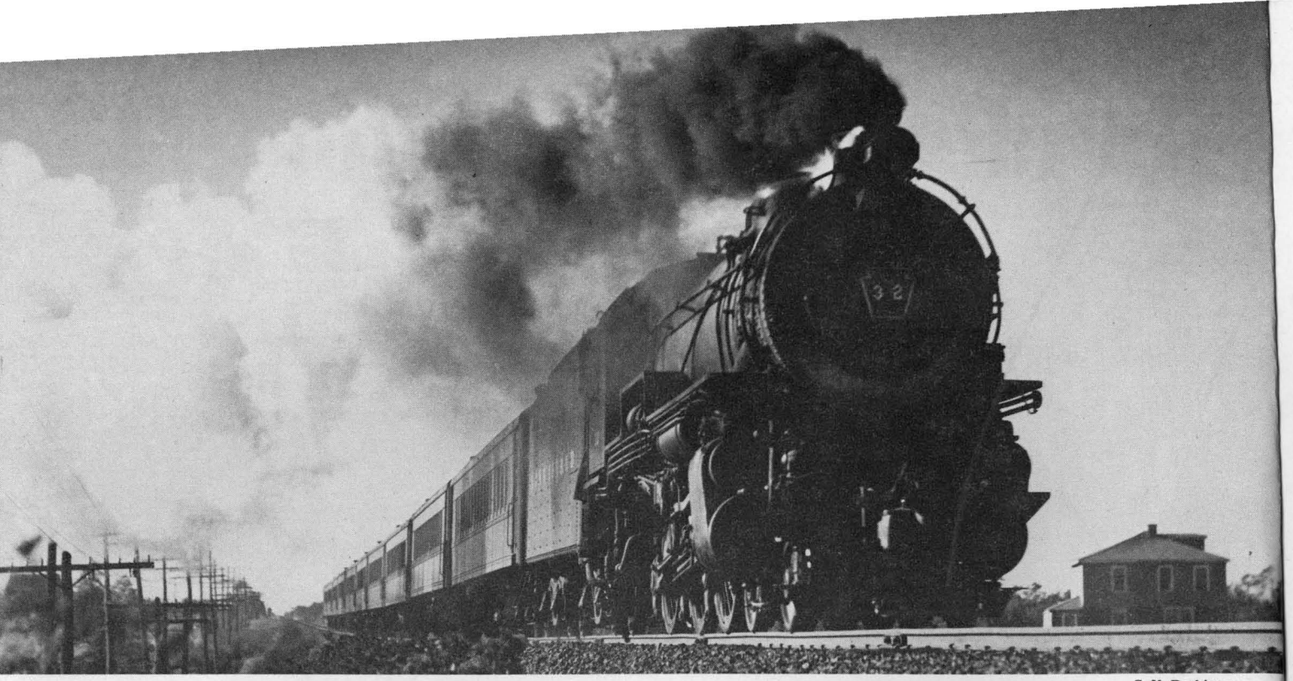
Here indeed was standardization on a grand scale such as existed on no other railroad. These Altoona-conceived methods, including production-line assembly in the erecting shop, predated anything Henry Ford had at River Rouge as well as Richard M. Dilworth's achievements with Electro-Motive. The Pennsy's universal boiler as applied to the G5s in 1923 boasted a maximum diameter of 76 ¾ inches, had 55 square feet of grate area in its wide Belpaire firebox, and had a total heating surface of 2862 square feet plus 798 for the superheater. Boiler pressure remained at 205 pounds.

A further parallel between the G5s design and past practice was the use of the 24 x 28-inch-size cylinders that had powered several hundred Consolidations of the H8 classes dating back to 1907. Thus the only real difference in these freight and passenger concepts was in the number and sizes of the wheels. A tractive effort difference of about 4000 pounds existed between the 68-inch drivers of the G5s and 62-inch drivers of the H8s.

Why did Kiesel blueprint 24 x 28-inch cylinders for the G5s? His prime requirement embodied a hefty starting tractive effort, and in the 2-8-0 groups of H8, H9, and H10, three proven quantities in boiler capacity-to-cylinder consumption existed. All three groups had cylinders with a 28-inch stroke and diameters of 24, 25, and 26 inches respectively. But on long pulls in full gear, the 26 x 28-inch cylinders of the H10s's sometimes overtaxed the boiler's steam-making capacity. So to be sure of an adequate steam supply for the 4-6-0, Kiesel chose the smallest of the three diameters. The decision proved to be a wise one.

After termination of the United States Railroad Administration and a three-year lapse in new-locomotive construction, in 1923 the floor of Juniata Shops' big erection building once again was cluttered with new boilers, wheels, underframes, and other parts. First came a run of 57 sorely needed K4s Pacifics in the 3800 series. Later in the year the first batch of G5s Ten-Wheelers was outshopped at a cost of $35,590 each including tender. The first G5s, No. 987, appeared in June bearing oval badge plates with serial number 3769 affixed to her smokebox flanks. In line with common PRR practice, these 40 engines carried indiscriminate road numbers. The engines mostly were assigned to Pittsburgh-area commuter work.

From stem to stern, the G5s looked Pennsy: big and brawny with a plain and neat appearance. However, beginning with the 1923 production, Kiesel added some "new look" embellishments to the standards of previous



C. V. Parkinson.

LONG ISLAND owned 31 G5s Ten-Wheelers, Nos. 20-50, and used them on virtually all nonelectrified routes. On November 18, 1947, G5s No. 32 nears her destination of Ronkonkoma with a mainline local. Sisters 35 and 39 survive as display exhibits.

G5s CONSTRUCTION RECORD

All Built at Juniata Shops, Altoona, Pa.

Shop Number	Date	Engine Number
3769	6/1923	987
3786	7/1923	1648
3787	7/1923	1689
3788	8/1923	1592
3789	8/1923	1594
3790	8/1923	1811
3791	8/1923	1844
3792	8/1923	2216
3793	8/1923	2442
3794	8/1923	2754
3795	8/1923	2811
3796	8/1923	2830
3797	8/1923	2904
3798	8/1923	2920
3799	9/1923	3064
3800	9/1923	3108
3801	9/1923	3109
3802	9/1923	3117
3803	9/1923	3571
3804	9/1923	3576
3805	9/1923	3802
3806	9/1923	3832
3807	9/1923	459
3808	9/1923	472
3809	9/1923	508
3810	9/1923	698
3811	10/1923	816
3812	10/1923	833
3813	10/1923	1073
3814	10/1923	1080
3815	10/1923	1112
3816	10/1923	1567
3817	10/1923	1589
3818	10/1923	1960
3820	10/1923	1961
3821	10/1923	1962
3822	10/1923	1963
3823	10/1923	1964
3824	10/1923	1965
3825	10/1923	1966
3851	1/1924	LI 20
3853	1/1924	LI 21
3854	1/1924	LI 22
3855	2/1924	LI 23
3925	8/1924	5700
3926	8/1924	5701
3927	8/1924	5702
3928	8/1924	5703
3929	8/1924	5704
3930	8/1924	5705
3931	8/1924	5706
3932	8/1924	5707
3933	8/1924	5708
3934	8/1924	5709
3935	8/1924	5710
3936	8/1924	5711
3937	8/1924	5712
3938	9/1924	5713
3939	9/1924	5714
3940	9/1924	5715
3941	9/1924	5716
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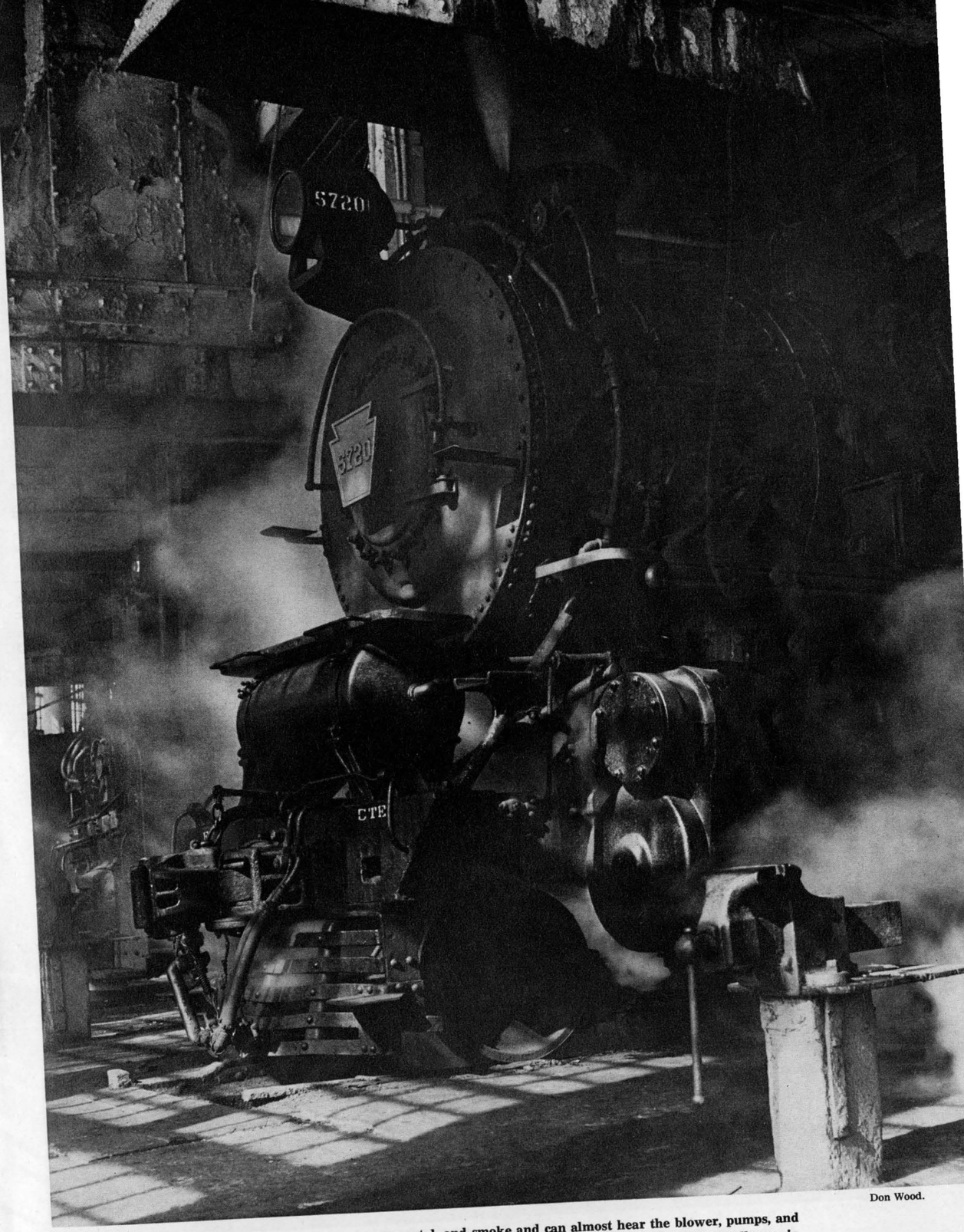
3947	9/1924	5722
3948	9/1924	5723
3949	10/1924	5724
3950	10/1924	5725
3951	10/1924	5726
3952	10/1924	5727
3953	10/1924	5728
3954	10/1924	5729
3955	10/1924	5730
3956	10/1924	5731
3957	10/1924	5732
3958	10/1924	5733
3959	10/1924	5734
3960	10/1924	5735
3961	11/1924	5736
3962	11/1924	5737
3963	11/1924	5738
3964	11/1924	5739
3965	11/1924	5740
3966	11/1924	5741
3967	12/1924	5742
3968	12/1924	5743
3969	12/1924	5744
3970	12/1924	5745
3971	12/1924	5746
3972	1/1925	5747
3973	1/1925	LI 24
3974	1/1925	LI 25
3975	1/1925	LI 26
3976	1/1925	LI 27
3978	1/1925	LI 28
3979	1/1925	5748
3980	2/1925	5749
4196	9/1928	LI 29
4196	9/1928	LI 30
4197	9/1928	LI 31
4198	9/1928	LI 32
4199	9/1928	LI 33
4200	9/1928	LI 34
4201	9/1928	LI 35
4202	10/1928	LI 36
4203	10/1928	LI 37
4204	10/1928	LI 38
4207	5/1929	LI 39
4208	5/1929	LI 40
4209	5/1929	LI 41
4210	5/1929	LI 42
4211	5/1929	LI 43
4212	5/1929	LI 44
4213	5/1929	LI 45
4214	8/1929	LI 46
4215	8/1929	LI 47
4216	8/1929	LI 48
4217	8/1929	LI 49
4218	11/1929	LI 50

years. For the first time appeared the slatted steel pilot, cast steel marker lights, and small all-steel cab. But her otherwise pleasing esthetics were hampered by the lame-duck look of that extra wide spacing between the second and third pairs of drivers. For this design, Kiesel might have researched the standard plan books back to Cassatt's originals of 1868, for classes G1 and G2 possessed the very same feature to assure better weight distribution. On the G5s, the distance between axle centers of the first and second drivers was 6 feet 3 inches; the second and third drivers had a spacing of 8 feet. This arrangement worked well from an engineering standpoint, but it also may have contributed to the rough riding qualities which weren't appreciated by engine crews.

The G5s had an unusually high firing deck, 83 inches above the top of the rail — a height normally associated with a much larger locomotive or a stoker-fired engine. In this case the height was occasioned by the 72-inch-wide Belpaire firebox which had to ride atop the 68-inch drivers. Many of the G5s's carried their air reservoir tanks crosswise on the pilot deck, a common practice on PRR Mikado and Mountain types, but some G5s's did not have the tanks up front. Special appliances were kept to a minimum: PRR's ultraconservative policy allowed Walschaerts valve gear, power reverse, and superheater but not feedwater heaters nor stokers. These two luxuries in the 1920's were reserved mostly for 10-drivered classes.

A notable idiosyncrasy in locomotive classification held sway for many years on Eastern roads such as PRR, Jersey Central, and Reading whereby a small letter "s" was included in the class to denote the presence of a superheater. By 1923 Pennsy motive power men had decided that superheaters were standard equipment. Thus G5s became the final new design to include the letter "s." The letter was continued through the 1920's as a part of the G5s class and for all K4s engines because they were established classes. However the new M1 Mountains (1923) and C1 0-8-0's (1925) dropped the "s."



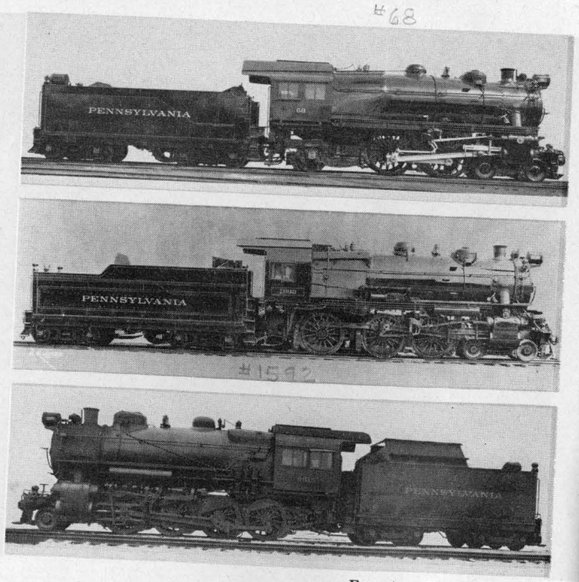
Don Wood.

YOU can almost smell the grease, metal, and smoke and can almost hear the blower, pumps, and turbogenerator as Pennsy G5s No. 5720 pants in her stall at the Camden (N. J.) roundhouse in October 1954. Photographer Don Wood terms this one of his three all-time-favorite rail photos.

DIMENSIONS IN STANDARDIZATION

Class	E6s	G5s	H8sb	H9s	H10s
Type	4-4-2	4-6-0	2-8-0	2-8-0	2-8-0
Introduced	1910	1923	1907	1913	1913
Cylinders (diameter x stroke)	23½ x 26[1]	24 x 28	24 x 28	25 x 28	26 x 28
Driver diameter	80″	68″	62″	62″	62″
Boiler pressure (lbs.)	205	205	205	205	205
Boiler inside diameter	76 ¾″	76 ¾″	76 ¾″	76 ¾″	76 ¾″
Total heating surface (sq. ft.)	3509[1]	3468[2]	3683[3]	3683	3683
Superheater surface (sq. ft.)	613[1]	613[2]	613[3]	613	613
Grate area (sq. ft.)	55.09	55.19	55.09	55.09	55.06
Weight on drivers (lbs.)	136,000	178,000	225,000	223,300	223,000
Total weight (lbs.)	243,600	237,000	252,500	251,000	247,500
Tractive effort (lbs.)	31,275[1]	41,328	45,327	49,183	53,197
Factor of adhesion	4.35	4.31	4.96	4.54	4.19

[1]Original design had 22 x 26 cylinders, 3582 sq. ft. heating surface, no superheater, 27,409 lbs. tractive effort.
[2]Original design had 3660 sq. ft. total heating surface, 798 sq. ft. superheating surface.
[3]Original design had 3842 sq. ft. heating surface, no superheater.



From top: E6s, G5s, and H10s.

BECAUSE the G5s's performance statistics were proven quantities, this Ten-Wheeler did not receive the extensive road testing which most other new standard road classes got before being put into mass production. Exactly one month elapsed between the outshopping of the first G5s and the first production run. This no doubt was just enough time to confirm the expected figures on the Altoona test plant and with a few road trials. Following the long-standing PRR practice of building nearly all of its own passenger power, the entire fleet of 121 G5s's was outshopped by Juniata. The original lot of 40 in 1923 was followed by Nos. 5700-5749 in 1924-1925; Nos. 20-50 for the Long Island were built between 1924 and 1929. At the beginning of the G5s program, 168 Ten-Wheelers were on the PRR roster; by 1929 the figure had dropped to only the 90 G5s's.

Although all 121 engines were basically the same, a few small variations occurred among the three groups. The original 40 had 798 square feet of superheating surface, but this was cut to 613 in the succeeding groups and probably was eventually made standard at the lower figure for all engines. Three tender types were used. The initial 40 pulled a class 70P82 which carried 7700 gallons of water and 16 tons of coal. The next 50 engines for PRR had a slightly revised version, the 70P82a with a 45-degree slope sheet and capacity of 8300 gallons and 12 tons. Because of Long Island's long express runs to Montauk, its G5s's received big tenders that resembled

IN the early 1940's G5s's migrated west to handle Chicago-Valparaiso (Ind.) commuter trains. Engine 1648 pulls south from Chicago's 21st Street interlocking with "Valpo" local 454 circa 1949.

Milton B. Nafus.

Bert Pennypacker.

AUTHOR PENNYPACKER often chased the "Skooky," Schuylkill Branch Sunday-only locals 685 and 686. With the northbound, G5s 5704 drifts into Haws Avenue, Norristown, last stop under wires.

those used with K4s Pacifics. This tender was the 110P82a with a 45-degree slope sheet (no stoker) and a bountiful capacity of 12,730 gallons and 14½ tons.

An engineman who latched out the throttle of a G5s had 41,320 pounds worth of tractive effort at his command. This represented a whopping excess in overpowering for the average three-to-six car commuter consist of P54 coaches, which weighed a total of only 135 to 270 tons. These figures afforded a jet-action acceleration that was well within the scope of power-to-weight ratios of the fastest streamlined limiteds. A check of some Pittsburgh area local schedules reveals that a G5s could come close to the performance of an electric M.U. train (as used in the East) on a comparative basis of distance, time, and number of stops. Conversely the doughty G5s became a heavy-duty workhorse on the 145-mile round trip of a milk-and-passenger train that labored through Pennsylvania's backwoods country between Sunbury and Bellefonte.

Although Pennsy accorded instantaneous acceptance to the superpower Ten-Wheelers, the Long Island was considerably more cautious. A full year separated LI's initial four-engine trial order and further acquisitions; eventually LI amassed a fleet of 31. Long Island's G5s's, intended originally for use on the 106.1-mile run between Jamaica and Montauk (which was termed "limited express service"), were equipped with the big new Kiesel-designed standard long-distance passenger tenders. But the engines proved so useful that they became a familiar sight on all LI non-electrified branches, often pulling to 10 or 12 cars. In later steam years, the larger K4s Pacifics of PRR ownership replaced G5s's on many of the Montauk trains.

WHERE THEY WERE USED

As of January 1, 1939

NEW YORK REGION

New York Division — 15 locomotives: 1961, 5701, 5703, 5704, 5705, 5706, 5707, 5708, 5709, 5710, 5713, 5714, 5715, 5717, 5724

EASTERN REGION

Williamsport Division — 2 locomotives: 1567, 1589

Wilkes-Barre Division — 11 locomotives: 833, 1073, 1080, 1592, 1960, 5700, 5716, 5718, 5723, 5725, 5726

Delmarva Division — 2 locomotives: 1112, 5719

CENTRAL REGION

Eastern Ohio Division — 8 locomotives: 2216, 5720, 5721, 5722; 5727, 5728, 5729, 5730

Panhandle Division — 18 locomotives: 987, 1594, 1811, 2442, 2754, 2811, 2830, 2904, 3802, 5731, 5732, 5733, 5734, 5735, 5742, 5743, 5744, 5749

Pittsburgh Division — 18 locomotives: 1944, 2920, 3064, 3108, 3109, 3117, 3571, 3576, 5736, 5737, 5738, 5739, 5740, 5741, 5745, 5746, 5747, 5748

Conemaugh Division — 1 locomotive: 3832

Monongahela Division — 1 locomotive: 459

WESTERN REGION

Grand Rapids Division — 14 locomotives: 472, 508, 698, 816, 1648, 1689, 1962, 1963, 1964, 1965, 1966, 5702, 5711, 5712

Note: As of January 1, 1939, the 90 G5s locomotives on the PRR were assigned to the above divisions. At that time, the New York Region's 15 locomotives were used principally on the New York & Long Branch route, but they later were switched to the Philadelphia Terminal and Chicago Terminal divisions. List supplied by Jack Hahn.

mento, Calif., in 1917). She carried No. 2371 and was class designated T-40. This engine presents a mechanical quandary. Although 2371 always has been termed the "largest" Ten-Wheeler by dint of a decided weight advantage over PRR's G5s, the T-40's starting tractive effort stood well below that of both Pennsy's and Reading's big 4-6-0's. The Espee engine seems to have evolved as an experimental version of the road's T-32, eight of which had come from Brooks in 1913. However, the T-40's expanded boiler size apparently didn't mesh well with carryover T-32 dimensions in cylinders, drivers, and boiler pressure. Or perhaps the monster proved too bulky for light-rail branch lines. At any rate, the T-40 remained one of a kind, and in 1918-1920, the SP shops went back to building the original T-32 version and turned out 13 of them.

The big Ten-Wheelers also included 10 Jersey Central Camelback 4-6-0's built by Baldwin in 1918 as fast freight hogs. They later were reassigned to passenger work. Nos. 780-789, although they differed little from the series beginning with No. 750 in 1910, carried a higher steam pressure (210 pounds vs. 220) and consequently posted a healthy tractive effort that just topped the 40,000-pound mark. The entire series of Ten-Wheelers was a familiar trademark of CNJ steam commuter service for many years.

THE G5s being a special breed of iron horse designed for special jobs, usually could be found only in certain areas; many PRR divisions never saw one. More than half of the PRR fleet (46 locomotives out of 90) was assigned to the Pittsburgh area commuter district. These engines operated out of the 28th Street enginehouse over portions of the Eastern, Panhandle, Pittsburgh, Conemaugh, and Monongahela Divisions. Interestingly, the train to Brownsville, Pa., was a through connection which used Pennsy passenger cars (including an RPO) over the Monongahela Railway on a weekday round trip to Fairmont, W. Va. At Brownsville, the PRR G5s changed places with a Monongahela 2-8-2.

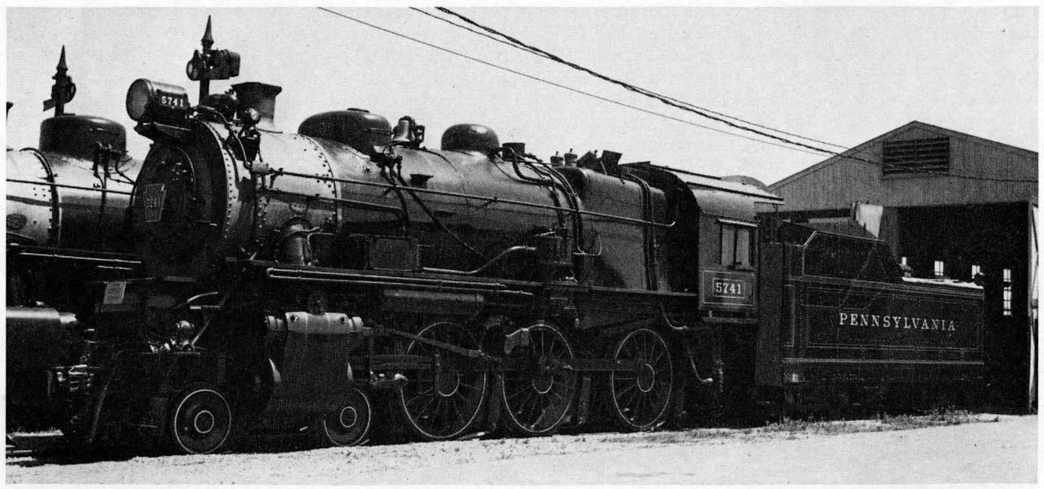
The second largest concentration of the "Pittsburgh commuter engines," as the G5s's often were called, was Long Island's 31 engines. Most of this group operated out of Morris Park enginehouse and Jamaica passenger station, where across-the-high-level-platform train changes were made between electric M.U. trains and the G5s-powered runs on non-electrified branches.

For many years 15 G5s's were assigned to the New York Region where they pulled commuter trains between Jersey City (Exchange Place ferry terminal), South Amboy, and Bay Head Junction, N. J. They also handled mainline locals to Trenton until electrification in 1933. The New York & Long Branch route to Bay Head Junction gave up its G5s power in favor of the larger K4s's around 1940. About that time the G5s made its initial appearances on Chicago-Valparaiso (Ind.) locals and in the Philadelphia-Camden-Trenton area on certain local runs over non-electrified routes.

The only other concentration of G5s assignments was on the old Grand Rapids & Indiana, which had been run with 4-6-0's since before the turn of the century because of light rail and bridges and a low volume of traffic. The passenger train between Grand Rapids and Mackinaw City covered 225.7 miles in about 7½ hours; this was the longest run of a G5s in both number of miles and total elapsed time on the road.

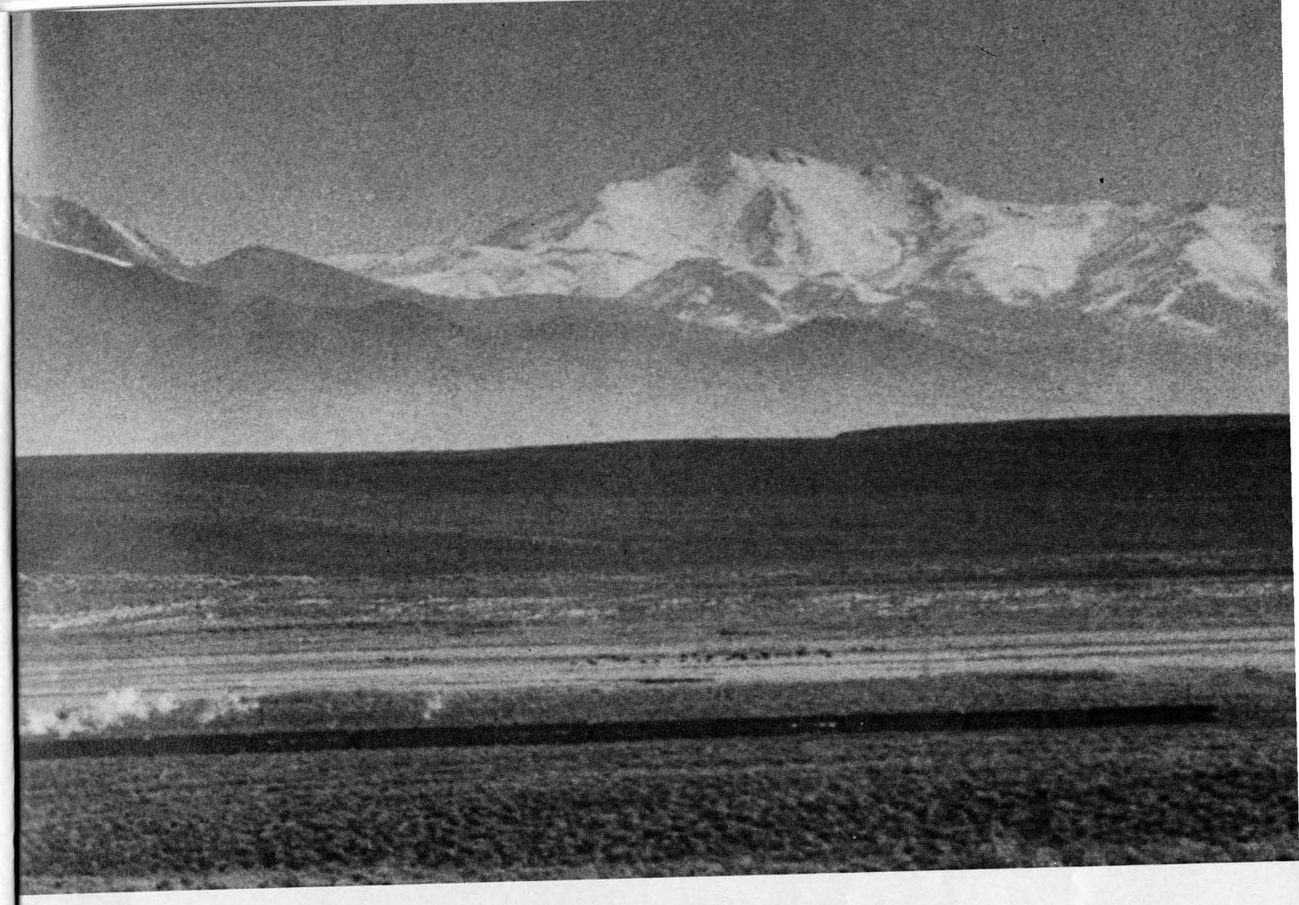
THIS unique Pennsy Ten-Wheeler class was an almost unnoticed workhorse among vast legions of Altoona-conceived standard classes, and it never achieved the accolade and glamor of the E6s, K4s, or T1. But the faithful and dependable G5s, agile as a Percheron and brawny as a Morgan, in her own right was a snooty highbrow among her peers of the commuter-hauling clan, for she was no mere mainline hand-me-down. Few Pacifics could outdo this brutish Ten-Wheeler, and no road except Pennsylvania claimed a standard steam boiler that served equally well on Consolidations, Atlantics, and Ten-Wheelers in an 1100-unit fleet spanning 16 years of development. In this Diesel Age of mass production and universally applicable internal combustion power plants, it is good that such counterparts of the Steam Age have been saved. All can see how it was done in another era, when the commuter boasted the status of a welcomed and unsubsidized guest who not only received good service but rode in trains pulled by locomotives specially designed for him.

Three G5s engines are known to be preserved. No. 5741 stands at the Pennsylvania State Transportation Museum in Strasburg, near Lancaster, which is operated in conjunction with the Strasburg Rail Road tourist line. An E6s 4-4-2 and an H10s 2-8-0 also are in this PRR historical collection. On the Long Island, the towns of Salisbury and Stony Brook display LI 35 and 39 respectively. I



Don Wood.

THREE G5s's survive: two from Long Island; and Pennsy No. 5741, refurbished at Altoona in 1969 in anticipation of placement in the Railroad Museum of Pennsylvania at Strasburg, Pa.



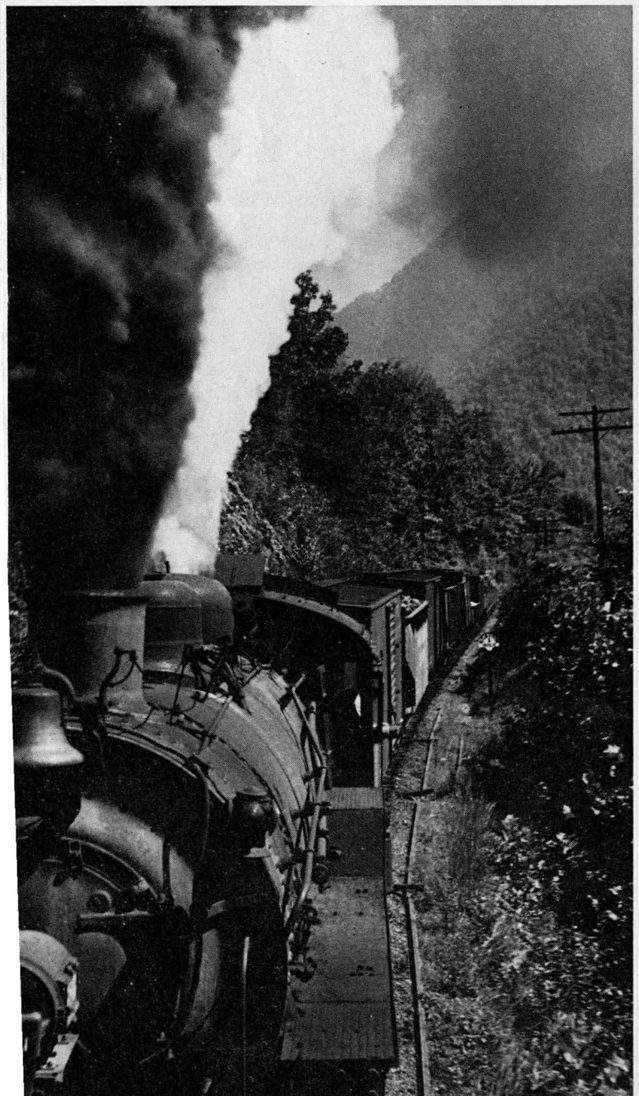
My favorite railroad photos

DEEP in North Carolina's Nantahala Gorge a pair of Southern Railway Consolidations hammer up a 4.2-per cent grade in a land that the Cherokee Indians named Valley of the Noonday Sun.

This daily run was nicknamed Blue Goose *by firemen who hand scooped for about 120 miles over three major ridges between Asheville and Murphy. The run required the fireman to perform a Jawn Henry feat of spreading 12 to 18 tons of coal in a galley-slave fashion while he attempted to stand on a bouncing steel deck.*

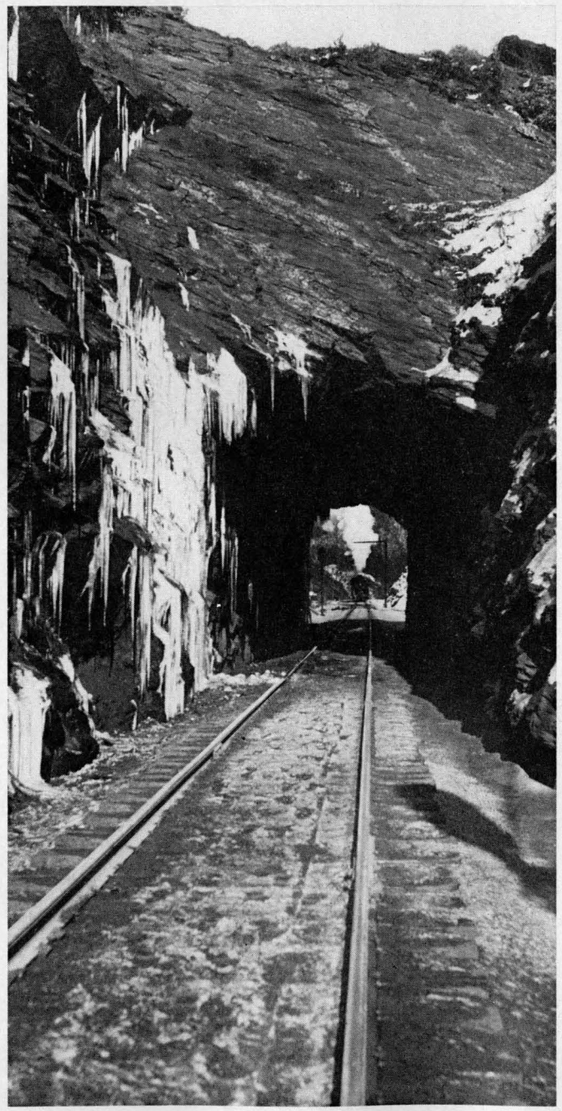
The midday photo was made in the early 1940's when as fireman I paid 75 cents to the brakeman on the lead locomotive to fire up the hill for me. To the consternation of Hogger Hyde, nothing in the company's 1300 rules could prevent such an arrangement.

The fireman on the second locomotive is taking a breather by hanging out the window until the stack clears after he deliberately has popped his engine to show off his abundant supply of steam.

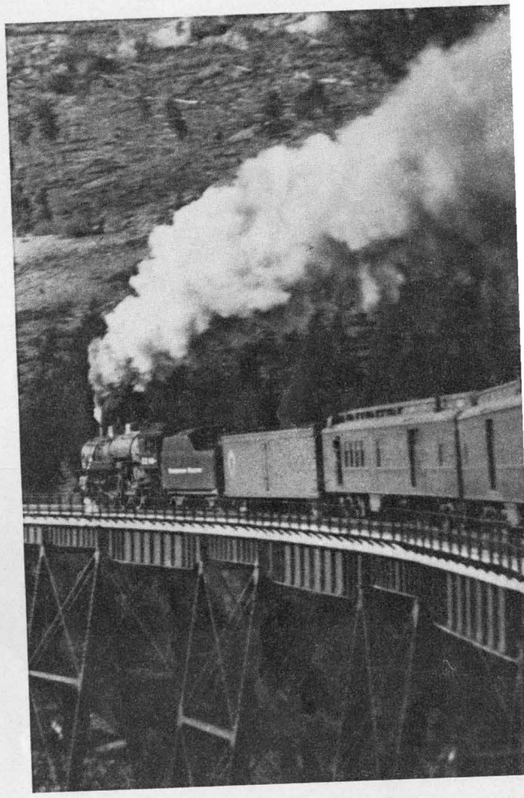


FRAMED by Jarretts tunnel on Southern Railway's mainline local headed by Consolidation 630 responds to the scoop of a toiling fireman. This locomotive and its sister (Consolidation 722) were overhauled at the Asheville roundhouse in the final hours of steam and were sold to the East Tennessee & Western North Carolina . . . and thus were saved from the torch.

Steam-minded Southern Railway President W. Graham Claytor Jr. swapped two Alco RS3 diesels to bring this pair of engines home again from the "ET." Today 630 and 722 bring joy to thousands of people who otherwise would have missed viewing and hearing the wonders of steam. One fan I met in Chattanooga voiced the hope that Mr. Claytor would live unto infinity!



THANKS to the Clinchfield Railroad, a photographer of contemporary vintage occasionally can shoot a timeless picture. Clinchfield 4-6-0 No. 1 of 1882 vintage blasts out of 527-foot Vance tunnel at Altapass, N. C., to celebrate her 90th birthday as the oldest standard-gauge locomotive operating in the United States. Only the fireman is showing. The date: August 19, 1972.



IN 1932 a Northern Pacific passenger local headed for Seattle, Wash., climbs Montana's Bitter Root Mountains west of Missoula.

I was on vacation from my job as rip-track laborer for the Southern Railway, and a day coach was my sleeping quarters. I was fully equipped with cruiser pack, shoebox lunch, and a handful of railroad passes. The destinations of my annual jaunts — flowing names that stirred gypsy rovings — were selected at random from a North American map: Riverton, Wyo.; Winterville, Me.; Bend, Ore.; Medicine Hat, Alta.; Percé, Que.; Loafers Glory, N. C.

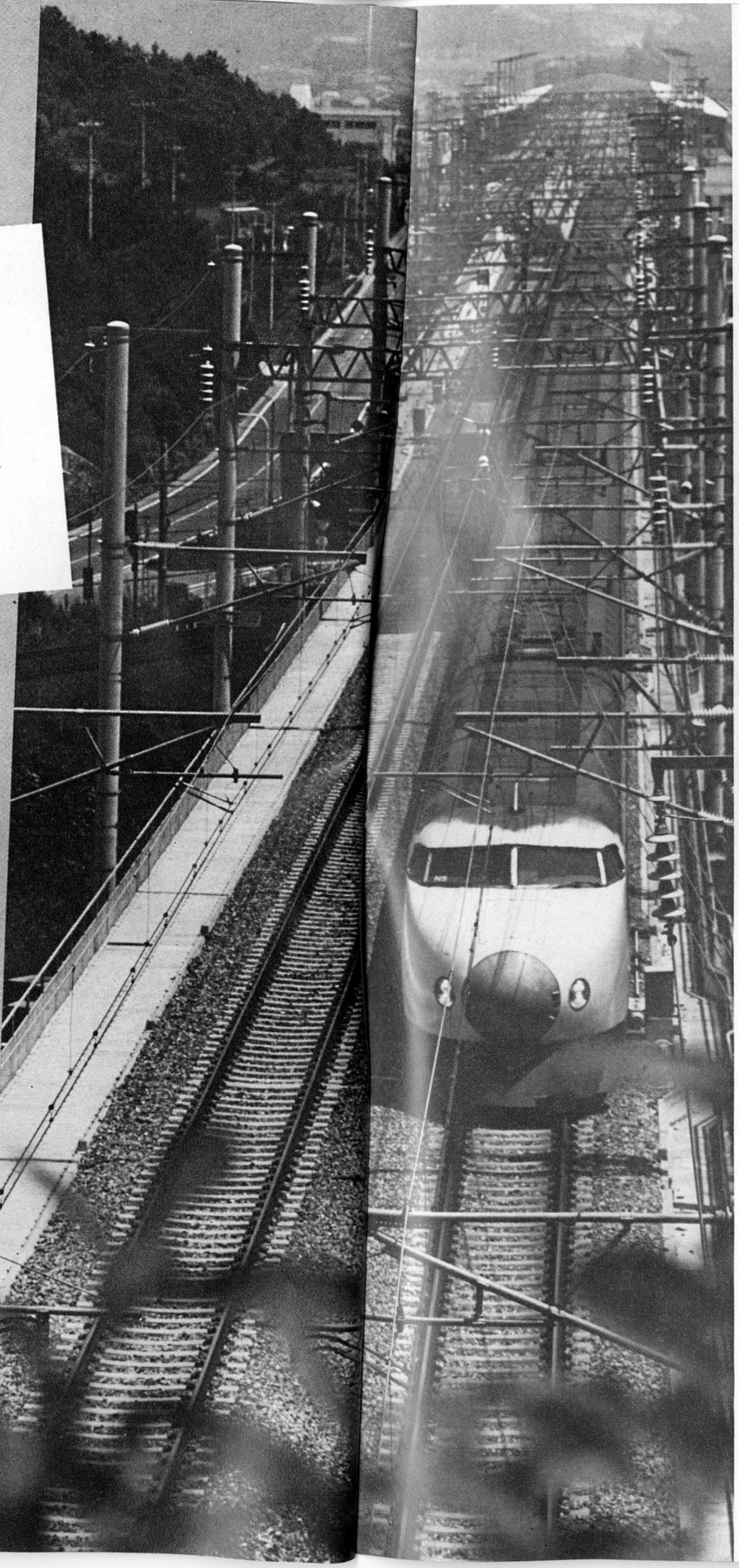
This picture is memorable in several ways. It was the first action railroad picture I took and was achieved with a $2.98 Brownie box camera. It taught me that part of life is based on what we see and on the strangers we meet — and that the man who waits until he has the time and the money never does anything . . . or goes anywhere.

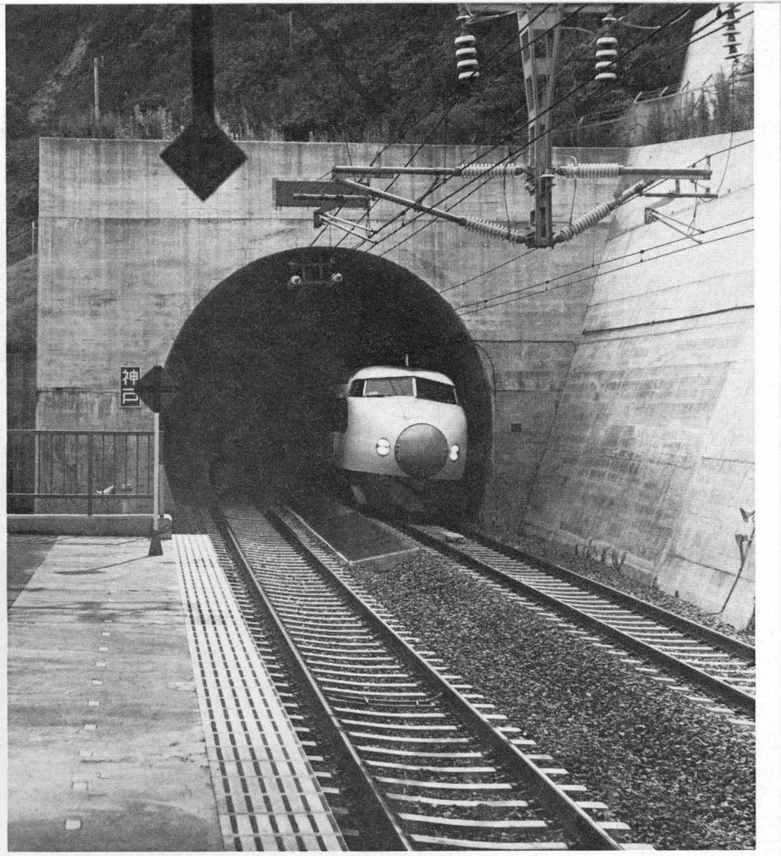
Bullet Train revisited

Shin Kansen are the magic words

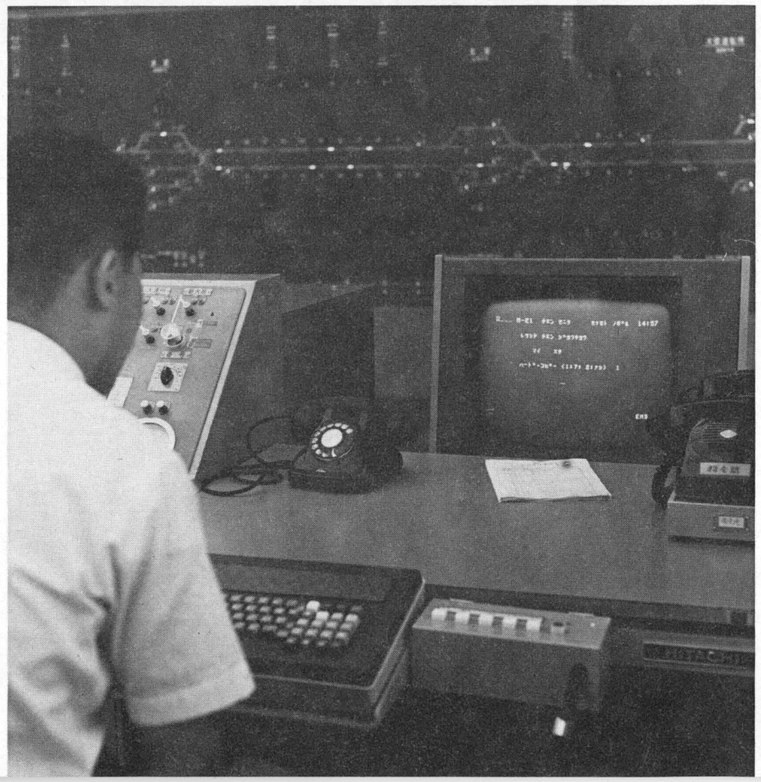
WILLIAM D. MIDDLETON

photographs / THE AUTHOR





OKAYAMA-TOKYO Hikari (Super Express) No. 6 emerges from the 5-mile Kobe Tunnel (above) and enters the Shin Kobe station on the New San-yo Line of JNR's Shin Kansen (New Trunk Line) system. At the opposite end of the station the rails enter the 10.1-mile Rokko Tunnel. Okayama-bound Hikari No. 55 nears a tunnel at Aioi (left). Dispatchers (below) are located in Tokyo Station and have at their disposal COMTRAC (Computer Aided Traffic Control).



THE Japanese National Railways last year opened the first extension of its high-speed "Bullet Train" system, thus enlarging upon one of the great railroad success stories of all time. This 103-mile initial section of JNR's New San-yo Line from Osaka west to Okayama improves on even the extraordinary technical standards of the original Tokaido route. The new line paves the way for a further acceleration of what is already the world's fastest rail passenger service and marks the beginning of an ambitious expansion of what JNR now calls its "Shin Kansen" (New Trunk Line) system. This system could link the major cities of all four of the principal Japanese islands with a 4350-mile network of high-speed, standard-gauge super railroads by 1985.

Relatively little in Japan's Shin Kansen represents wholly new rail technology, despite superlatives such as "train of tomorrow," "next generation railroad," and similar ones that have been heaped on this remarkably successful railroad. The Japanese instead have added some impressive technical advances to essentially orthodox rolling stock and control systems, and have combined them with excellent standards of track alignment and surface. This has pushed the speed and productivity of a conventional railroad very close to what may be its practical limits.

This super railroad has been expensive to build. Construction costs for the 320-mile NTL were reported to be more than 1 billion dollars — about 3.3 million a mile. And JNR has been able to sustain NTL's high level of performance from essentially conventional equipment and track only at the price of constant, meticulous, and very costly maintenance. In 1969, for example, JNR reported Tokaido Line equipment and track maintenance costs of 32 million dollars.

Yet, given the particular traffic conditions of the Tokaido corridor, this approach to high-speed railroading has proven to be an enormously successful one for JNR. Indeed, the statistics of the Tokaido Shin Kansen success story are little short of phenomenal.

During the first six months after it opened on October 1, 1964, NTL's 130 mph M.U.'s operated 60 trips daily with an average daily traffic load of 61,000 passengers, which compares with Amtrak's daily load of 51,142 in March 1973. NTL traffic reached three times the 61,000 level in only four years, and on one record-breaking occasion (May 5, 1969) NTL trains moved 520,000 passengers in a single day.

By the Osaka "Expo 70" year of

Edward J. Wojas photo

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