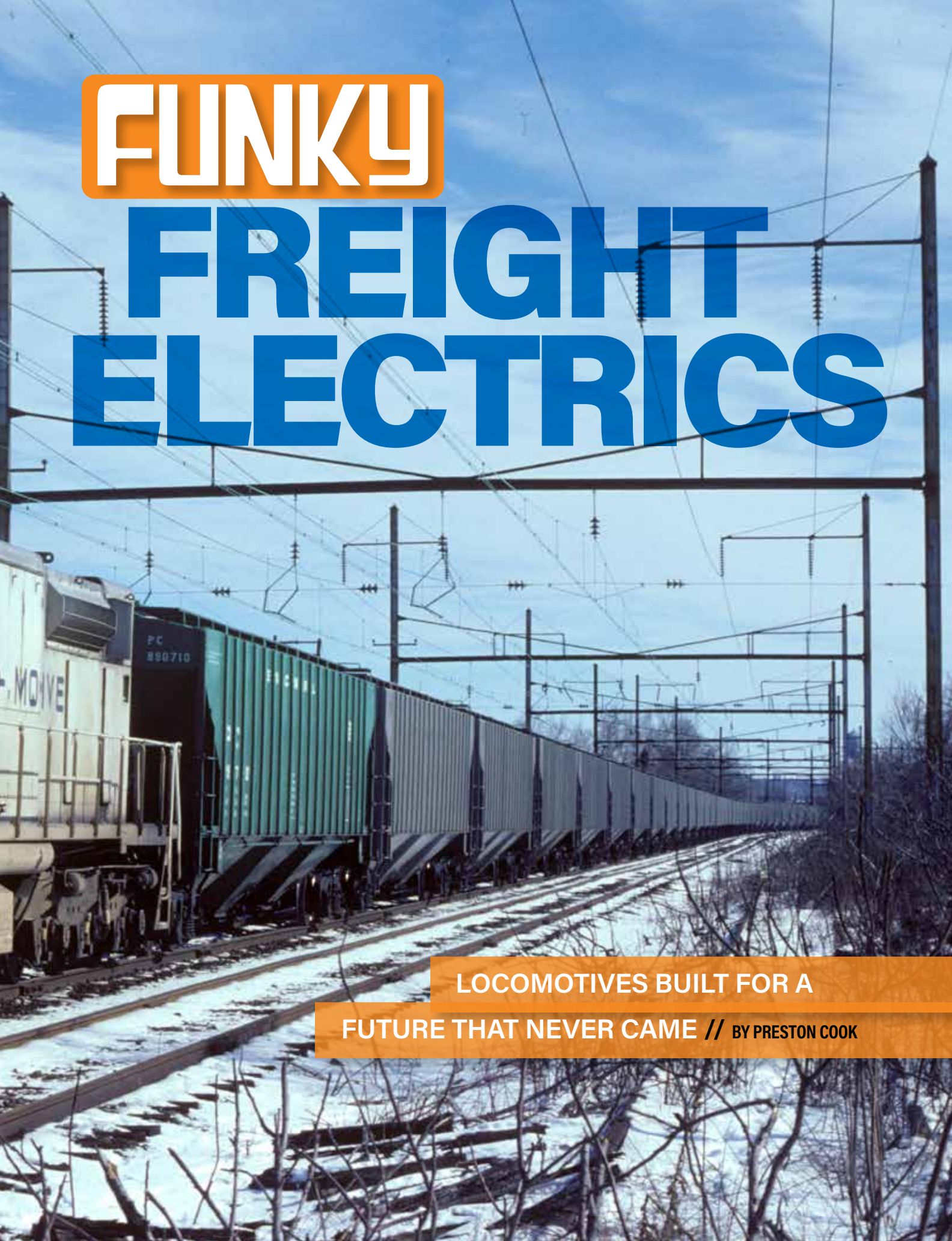
In a rare opportunity to show what it can do, EMD's GM6C heads a train of grain hoppers in February 1979 at Middletown, Pa.

Stephen J. Salamon, David P. Oroszi collection

FUNKY FREIGHT ELECTRICS



LOCOMOTIVES BUILT FOR A FUTURE THAT NEVER CAME // BY PRESTON COOK

In the early 1970s, the Electro-Motive Division of General Motors in La Grange, Ill., was a busy place. It was, at the time, the largest manufacturer of diesel-electric locomotives in the world. Its facility was running close to the maximum capacity of 5½ new engines a day.

EMD became the dominant diesel builder after overtaking Alco and General Electric in the 1930s. The dieselization of U.S. railroads had kept EMD busy for decades, and the replacement cycle for the first generation was reaching its peak.

But, during this period of great production and prosperity, storm clouds were gathering. EMD management recognized the diesel locomotive market was shrinking. Fewer, more powerful and efficient diesels were replacing older units. Management determined this would have a significant effect on EMD's sales volume by the 1980s and began looking into diversification to lessen the blow.

In 1972, I was a service engineer for EMD's northeastern region sales and service organization. At a regional meeting sales manager Warren Fox detailed markets the company was looking into.

Options included larger participation in building mining trucks and oil drilling equipment; consideration of wider use of electric transmission systems in the marine industry; and packaged power-generation units. Also mentioned were increased involvement in refrigerated railroad transport, a diesel-electric version of the Budd RDC, and possibilities for expanded use of electric locomotives.

EMD wasn't a major participant in the latter market in North America as it had very limited potential. The primary users of electric locomotives were Amtrak and Penn Central, both of which were operating former Pennsylvania Railroad GG1s. PC was also running ex-New Haven Railroad E33 and EP5 electrics and ex-Pennsy E44s in freight service.

Penn Central was broke. That left Amtrak as the largest potential customer, and it was the passenger carrier's needs that would primarily drive EMD's involvement in electric locomotive production.

In the longer term, there would be potential for electric locomotive sales to newly formed transit agencies operating on electrified segments of Amtrak and PC. EMD would partner with Sweden's ASEA (Allmanna Svenska Elektriska) to develop electric locomotives suitable for service in North America, with sufficient domestic manufacturing content to qualify for U.S. government contracts.

At the same time, other factors were developing that would have an impact on EMD's future share of the locomotive market and its development of products for the railroad industry.

The price of oil was increasing and the supply of it less certain. EMD's diesels were known to generally have higher fuel consumption per horsepower-hour than those made by primary U.S. competitor General Electric. This trend would take a few more years to reach its zenith but would become a significant commercial advantage for GE by 1980.

In the early 1970s, though, the rapidly increasing price of diesel fuel was enough to compel several major railroads to seriously consider electrification of some of their mainline trackage. Electric locomotives were promoted as an alternative to petroleum, using commercial power pro-

EMD saw no reason to re-invent aesthetics. Save for the pantographs, the GM6C much resembled a diesel. EMD, Preston Cook collection

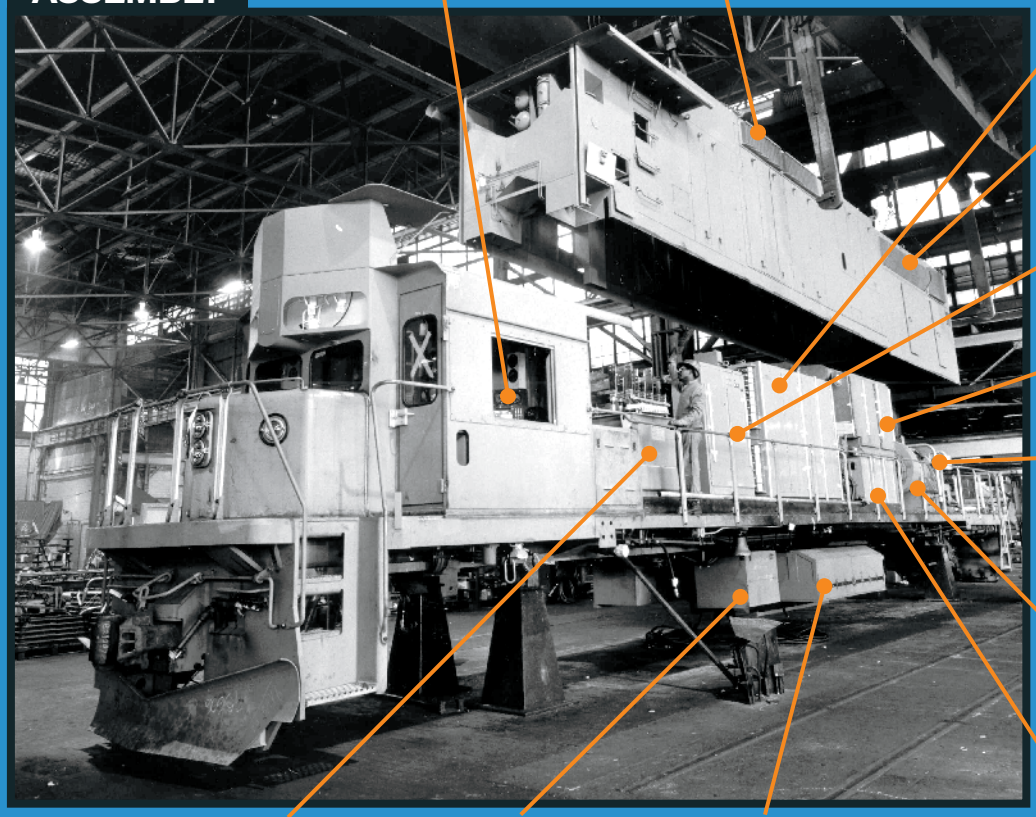
EMD HAD PRODUCED THE LARGEST NUMBER OF DIESEL LOCOMOTIVES OF ANY MANUFACTURER DURING THE EARLY POSTWAR PERIOD

Left: Distrusted by operating departments, EMD's freight electrics did a lot of waiting. Here, on Feb. 26, 1977, GM10B is in the company of a pair of Conrail GG1s at Kearny, N.J. Jim Sorenson, David P. Oroszi collection

Below: EMD put the full weight of its design department behind the electric freight locomotive program. EMD, Preston Cook collection

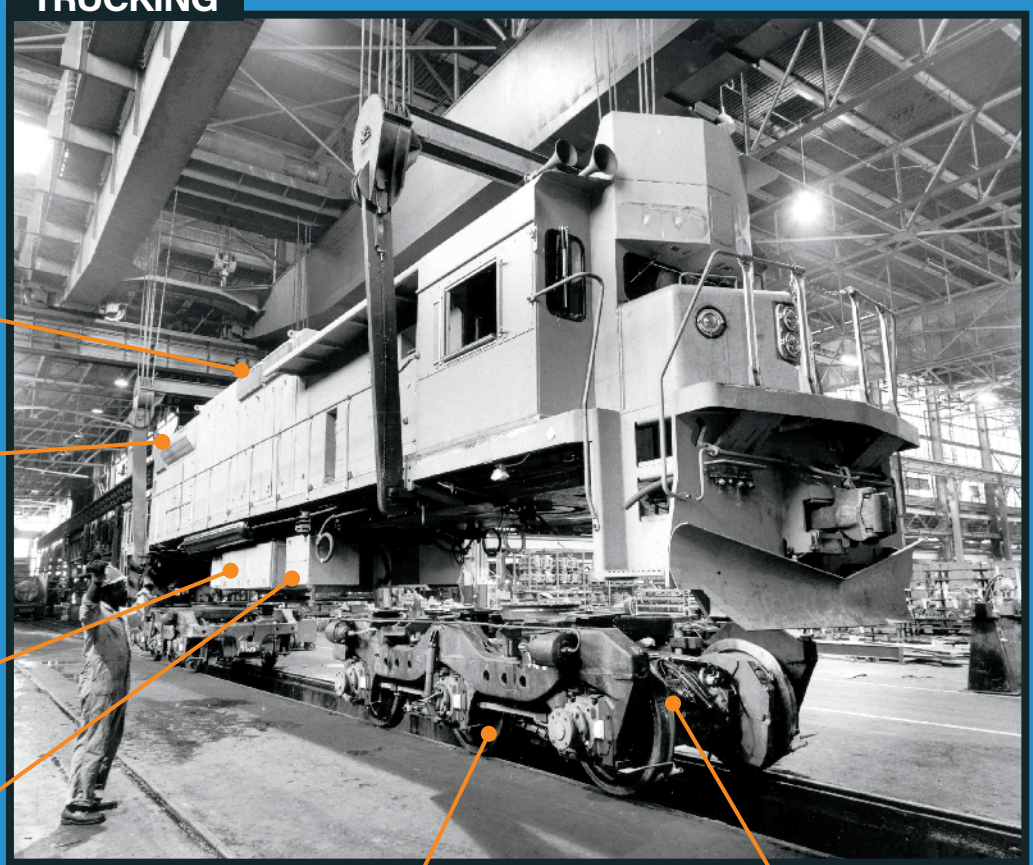
Also like its diesels of the era, the EMD sales department had dramatic illustrations of the GM10B created by commercial artist Tom Fawell. EMD, Preston Cook collection

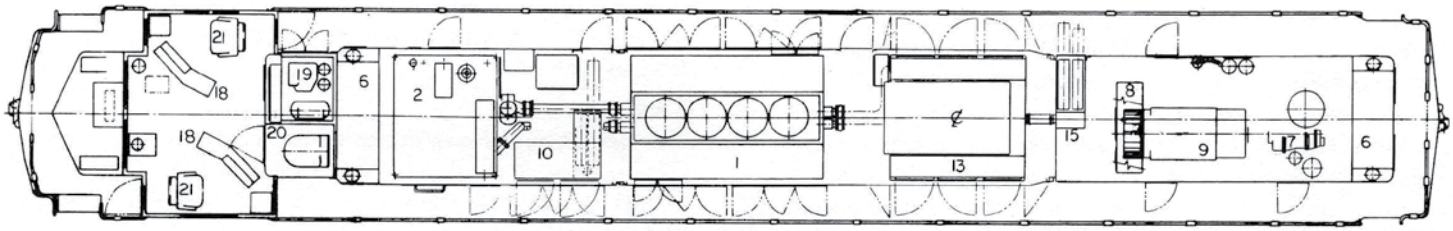
ASSEMBLY



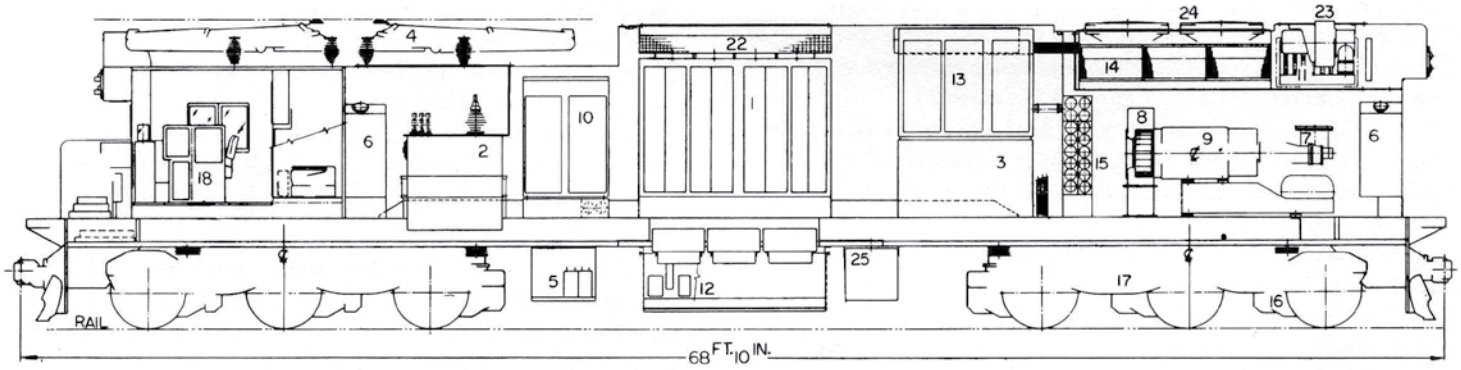
TRUCKING

The GM6C's frame and truck spacing were dimensionally similar to the SD40-2. There were differences, however, in the stepwells and other features. Two photos, EMD

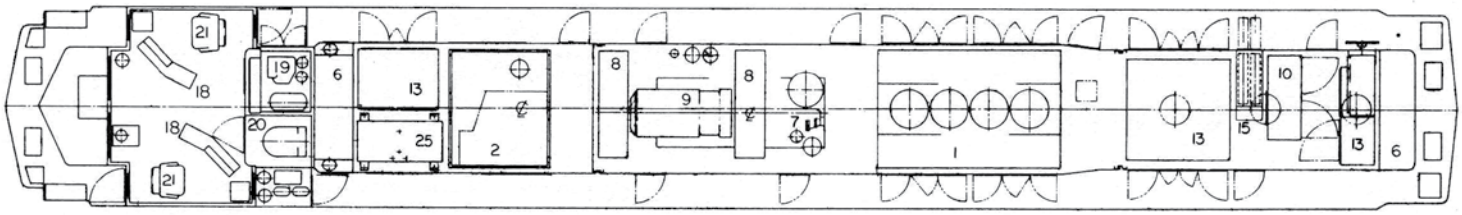




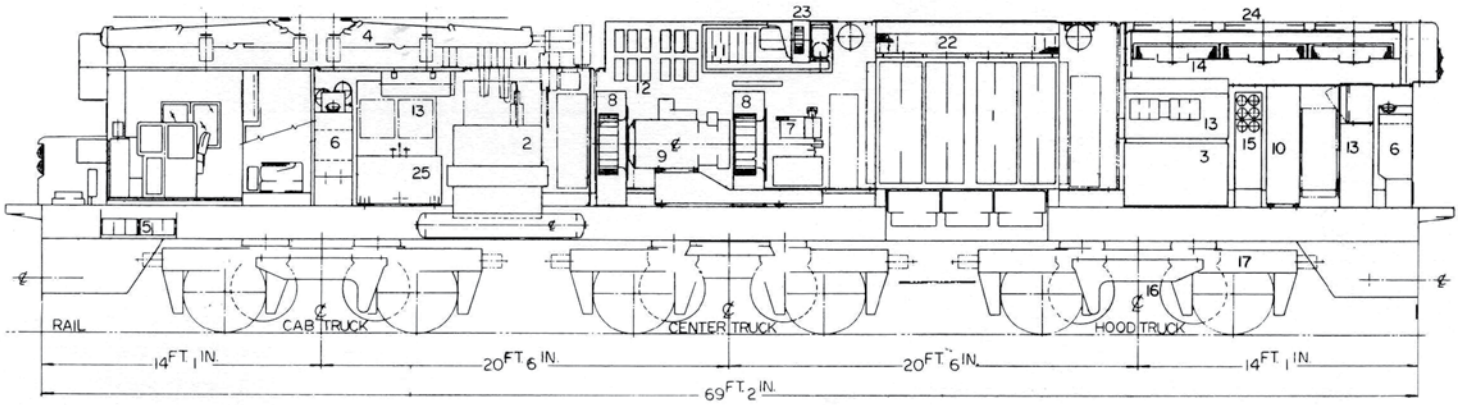
GM6C



1 Thyristor convertor
2 Main transformer
3 Sm. reactor-traction mtrs.
4 Pantograph
5 Batteries
6 Sand box
7 Air compressor-rotary
8 Traction air blower
9 Motor-generator
10 Electronic cabinet
11 Inertial filters
12 Filter capacitors
13 Elect. control cabinet
14 Dynamic brake grids
15 Elect. cabinet air filters
16 Traction motors-E88
17 Truck-HTC
18 Eng. cont. stand (dual)
19 Air brake equipment
20 Toilet compartment
21 Cab seat
22 Air inlet grills
23 Dust bin blower
24 Dyn. brake cooling fan
25 Sm. reactor-motor/gen.



GM10B



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12 Filter capacitors
13 Elect. control cabinet
14 Dynamic brake grids
15 Elect. cabinet air filters
16 Trac. mtrs.-LJH-108-3
17 Truck
18 Eng. cont. stand (dual)
19 Air brake equipment
20 Toilet compartment
21 Cab seat
22 Air inlet grills
23 Dust bin blower
24 Dyn. brake cooling fan
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■ More technical details about EMD's electric freight locomotives at **Trains.com/ctr**

duced by coal-fired, nuclear, and hydro-electric plants.

Certainly, the Penn Central wasn't enough of a market to justify a large development effort for electric freight locomotives. But when the potential needs of a group of profitable Western railroads were added, it became an option worth considering.

A BUDDING PARTNERSHIP

GM negotiated a non-exclusive licensing agreement with ASEA early in 1972, allowing Electro-Motive to access and apply the Swedish company's thyristor and power control technology for locomotive applications.

In 1973 Amtrak was looking for a modern electric locomotive to replace its aging fleet of GG1 electrics and its first Request For Proposals attracted submissions from GE as well as EMD. The latter proposal was based around the class Rc 4,800 hp "universal" freight-passenger electric locomotive first built by ASEA for the Swedish railroads in 1967. It was probably quite a shock for GE, which had for years dominated the U.S. electric locomotive market.

Built to between 84 and 88 tons, the Rc locomotives were a very small and light machine compared to traditional U.S. electric passenger locomotives. The EMD proposal was in opposition to some details of the Amtrak RFP; the passenger carrier looked but didn't buy.

The business went to GE with its E60CP, a 194-ton passenger adaptation of its family of 6,000 h.p. electric locomotives. Subsequent events surrounding the E60CP would change the Amtrak situation in favor of EMD, but that took several years to materialize.

GE began to deliver the E60CP electrics to Amtrak in 1974. It wasn't long after that crews reported the new units had some unusual ride characteristics at high speeds: episodes of violent truck oscillations with excessive vibratory yawing (truck side-to-side movements).

Then on Feb. 24, 1975, a newly delivered E60CP on a test train with a test car and seven coaches derailed at speed near Elkton, Md., bringing the problems to national attention.

The National Transportation Safety Board investigated the crash, stating in its Safety Recommendation it was due to "excessive vibratory yawing" and oscillations in the trucks.

As a result, the Federal Railway Administration was directed to monitor testing of E60CPs, making sure the issues were fixed before the locomotives could be put into service.

When they did get to run, the EMD freight electrics showed the designs were more than viable. Here, GM6C on Conrail, Feb. 11, 1979, at Middletown, Pa. Stephen J. Salamon, David P. Oroszi collection

The units continued under investigation for several years after with modifications and speed restricted to 85 mph.

Eventually Amtrak began looking at smaller, lighter electric passenger locomotives, particularly European designs such as the ASEA Rc.

In the meantime, though, EMD was on the outside of the electric locomotive business looking in.

AN OPENING IN FREIGHT?

It was a long time between requests for proposals hitting the street. During this period where all EMD could do was wait, the Arab oil embargo happened.

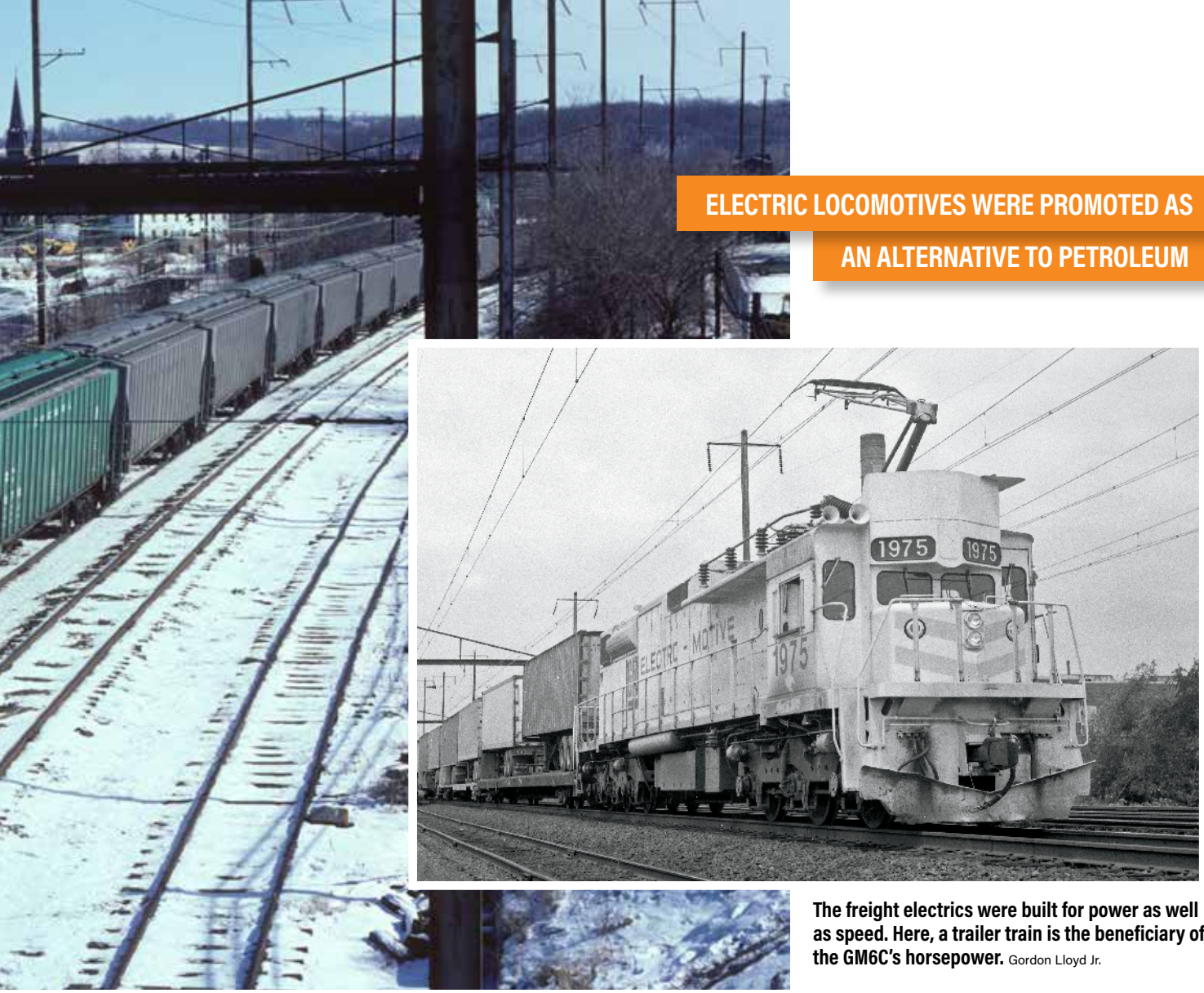
Freight railroads began to get nervous about the supply and cost of diesel fuel and started taking a more serious look at electrification. But for it to happen, the price of diesel fuel would have to shoot up and stay there to justify the colossal initial expense of erecting the many miles of catenary that would be needed.

Around 1973 the EMD Engineering Department began design work which would result in two electric locomotive prototypes: the GM6C and the GM10B. The former, which took shape in 1975, was a 6,000 h.p., six-axle unit for a wide range of applications, utilizing similar equipment to, or directly derived from, the popular SD40-2.

The GM10B was a much more specialized high-horsepower product for fast freight service. It employed an unusual B-B-B truck arrangement, with running gear much more European in profile than North American.

In both, EMD adapted whatever it

ELECTRIC LOCOMOTIVES WERE PROMOTED AS AN ALTERNATIVE TO PETROLEUM



The freight electrics were built for power as well as speed. Here, a trailer train is the beneficiary of the GM6C's horsepower. Gordon Lloyd Jr.

EMD in the domain of GEs: The GM10B stands out among the grimy Conrail E44s at Meadows, N.J., in 1977. William Rosenberg, David P. Oroszi Collection

Harrisburg was a familiar haunt for the freight electrics, more for the GM10B, seen above on a test train there in October 1979. Denny Hamilton **New GM6C 1975 visited July 8, 1975, rubs shoulders with a PC GG1 on an Amtrak train at right.** J. David Ingles, Brian M. Schmidt collection

could of the frame, cab, and hood design practices from the diesel line, resulting in some family resemblance.

TESTING PERIOD

The GM6C began testing in 1975, the GM10B in 1976. The only practical choice for evaluation at that time was on the Penn Central, which was in the final stages of its bankruptcy and about to become Conrail. You could hardly select a more indifferent operating environment.

The railroad had no money to spend maintaining or troubleshooting someone else's locomotives, and discouraged management had its hands full just operating the basic service with its own tired equipment. The electrics demonstrated they were capable when and if they were run, but the railroad was understandably skeptical of this new, unproven product from a manufacturer with little electric locomotive experience.

It was hardly a surprise that one of the technical engineers was passed an insult by a shop manager who said that the best tool for measuring the availability of the two electrics was a stopwatch.

They did have their moments though, and one of the better features was the ride quality of the very unusual B-B-B-trucked GM10B. Several people commented on how stable the locomotive was and that it surprisingly negotiated track that was in very poor condition. One rider mentioned pulling through a yard where the rail had many low joints and watching the freight cars rock back and forth behind the GM10B which was giving little indication in the cab of how bad the track was underneath.

As the test period progressed, EMD's Engineering Department was able to get useful information back about the functioning of the new products. This was valuable for the design process of a new electric passenger unit that would be bid the next time Amtrak put out a Request for Proposals. The passenger carrier was continuing to deal with E60CP issues and the opportunity to build some new passenger electrics was soon to arrive.

Meanwhile, the overall situation for electric freight locomotives was moving from bad to worse. In 1973, in the wake of the Regional Rail Reorganization Act, Amtrak had begun acquiring portions of the Northeast Corridor that were not already owned by regional transportation authorities. By the time Conrail was formed in 1976, the passenger carrier owned the entire corridor except for portions owned by Massachusetts Bay Transit Authority and Connecticut Department of Transportation.

In the mid-Atlantic region, Amtrak also owned the electrical distribution network on the former PRR lines, a major part of electric freight operations in the Eastern U.S.

Amtrak's mandate was to operate passenger service, not haul freight, and the Conrail freight traffic on the electrified lines was increasingly unwelcome. Amtrak initiated surcharges on electricity and car movement, and Conrail responded by moving as much of its traffic as

possible onto its other lines that paralleled the electrified routes. Conrail was retiring the electric locomotives passed along from Penn Central, except for the ex-Pennsy GE E44 units, and there were no signs that the need for new electric freight units was going to surface again.

In this environment of lack of need and neglect, the GM6C and GM10B continued to test for several years. The GM6C was versatile and was operated on many parts of the Conrail electrified system. The GM10B was more of a specialty locomotive for high-speed, high-value freight, and tended to be operated between Harrisburg, Pa., and Kearny, N.J., on intermodal trains operated at night to keep out of Amtrak's way during daylight.

While this testing was going on, significant advances were being made that would increase the locomotives' utility and effectiveness. Bruce Meyer and Gordon Itami, operating trains on the EMD club model railroad layout (ELMOD Lines) had noticed that their HO scale locomotives would produce their greatest tractive effort with a small and controlled rate of wheel slippage. They successfully adapted this phenomenon to practical application with the introduction of the EMD "Super Series" wheelslip control on the GP40X locomotives built for Santa Fe, Union Pacific, Southern Pacific and the Southern Railway.

While the predecessor Dash-2 WS10 wheelslip system had an all-weather dispatchable adhesion of about 18% and a best-case adhesion of around 24%, the "Super Series" control was able to increase adhesion under most rail conditions by as much as 25% over the Dash-2 level. This was bad news for the electrics, EMD's in-house diesel controls were overtaking ASEA's proprietary wheelslip control technology.

NOT A TOTAL LOSS

Conrail decided in 1982 to discontinue electrified freight operations and dispose of their remaining dedicated locomotives. This slammed the door on any prospect of a large market for new electric freight locomotives developing in the United States.

The fuel shortages and rationing were long forgotten, diesels were improving in efficiency and effectiveness, and no railroads were interested in the GM6C and GM10B. They were quietly returned to La Grange and slowly deteriorated in the back lot while various parts were "liberated" from them for use in other engineering prototypes.

Years passed, they deteriorated, and finally were relegated to the scrap yard. No museum stepped up to preserve them and their passing went almost unnoticed.

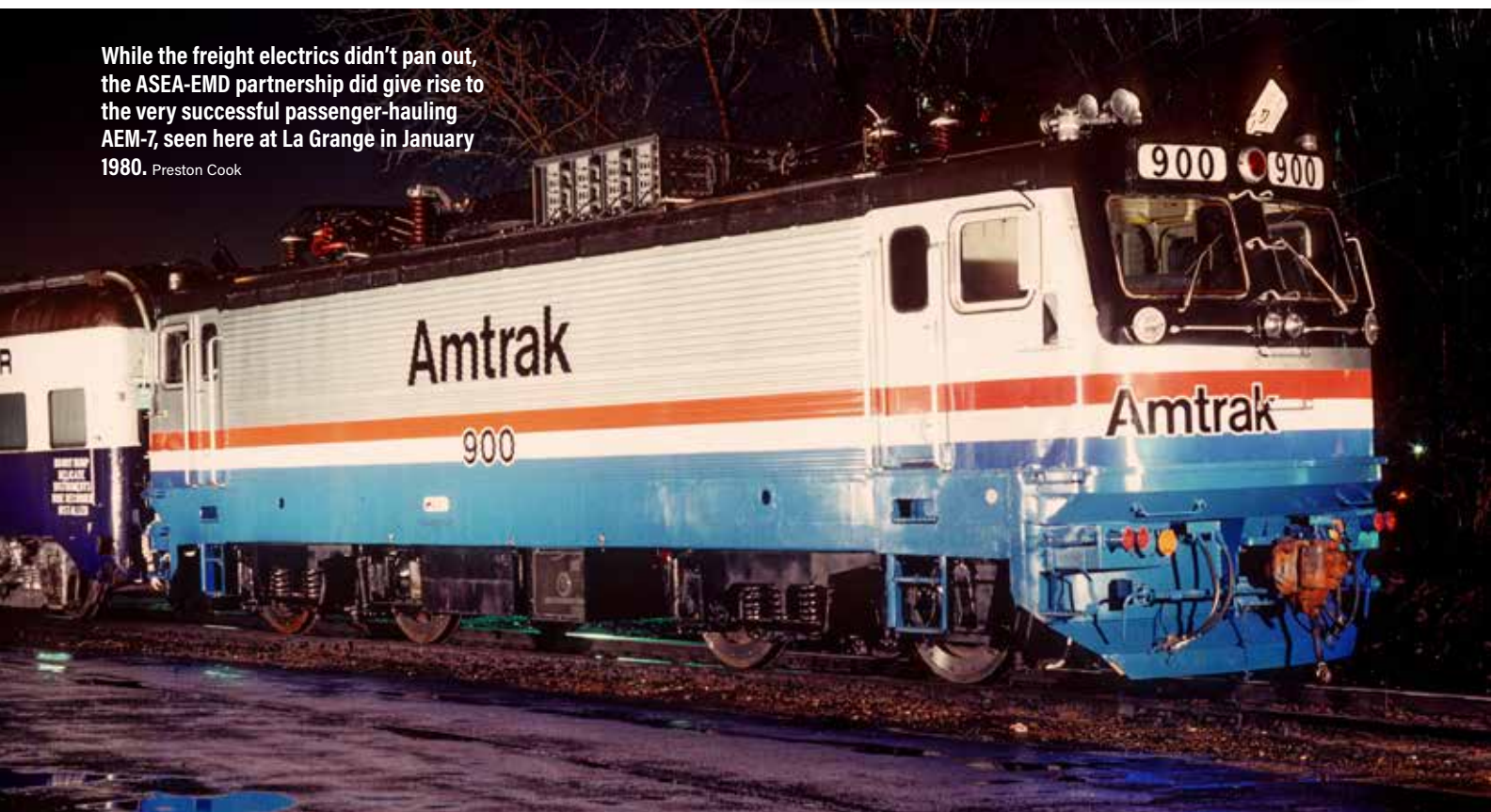
The effort that went into them was not wasted, however. Two subsequent orders for electric freight locomotives were handled by EMD associates using ASEA technology based on the experience with the GM6C locomotive.

Seven derivative GF6C electric locomotives were built by GM Diesel Ltd. in London, Ontario, for British Columbia Railway in 1983-1984. EMD South Africa built 30 model GM5FC electrics in 1985 for South African Railways' coal line at Richards Bay. These were followed by an additional 15 a few years later, built by Delta Motor Corp. after GM divested itself of its South African business units.

Electro-Motive's involvement in the electric locomotive market was brief. Despite the failure to sell the GM6C or GM10B in the U.S., overall, it was successful. The locomotives produced in the EMD-ASEA collaboration proved their concept and construction to be acceptable. The AEM-7 passenger units went on to long and successful operating lives with Amtrak and several transit agencies.

Ultimately, it was the failure of the market to expand in the manner many had predicted in the early 1970's that ended the efforts to sell electric freight locomotives in the U.S.

THE ONLY CHOICE FOR EVALUATION WAS ON THE PENN CENTRAL, WHICH WAS IN THE FINAL STAGES OF BANKRUPTCY



While the freight electrics didn't pan out, the ASEA-EMD partnership did give rise to the very successful passenger-hauling AEM-7, seen here at La Grange in January 1980. Preston Cook