

# Growing up with Trains One Engineer's Dream

by Dr. Arthur D. Delagrange, Massachusetts Beta '62

At an early age I knew I wanted to be an engineer. However, I was confused as to exactly what this meant. My father was an engineer; he disappeared into a factory building at 8 a.m. and came out at 5 p.m. I had seen the machinery inside, but it was mostly unattended, and what little I saw being done by people seemed rather uninteresting. On the other hand, I often walked down to the railroad tracks to watch the huge locomotives thundering by. The man at the throttle was also called an engineer. Now that looked like fun!

As I learned more I came to realize I had it backwards. I went to engineering school to learn how to design wonderful things (circuits, in my case) and made a decent living at it. Alternatively, it was impressed upon me that the railroad engineer basically just had to obey orders. If anything exciting happened, it was probably unpleasant. In fact, on a passenger train, the conductor was the man in charge. I engineered toy trains for 40 years before I had a chance to drive real locomotives.

## THE NORFOLK & WESTERN RAILWAY

We lived in a loop of the New River Valley, VA, and on three sides of us had two of the more interesting railroads in the country: the Norfolk & Western (N&W) and the Virginian (VGN). I didn't realize I was watching history unfold, or fold up (if one is a lover of steam power). I would like to recount those glory days—personal memories, tales told me by the old-timers, and far too many things I learned after the fact.

The N&W was the last major railroad to rely on steam power. Its president at the time said that no diesel would run on its tracks as long as he was in charge. A Southern Railway train headed north for Washington, DC, would have its engines replaced by N&W steam at Bristol, TN/VA, and then a diesel put back on at Lynchburg, VA, for the rest of the trip.



Steam survives at the Durango & Silverton Railroad and Museum in Colorado.

When a new president took over, diesels were brought in as fast as they could be bought, begged, or borrowed. They required less infrastructure (no watering, no frozen coal, no ash, no external moving parts, and less maintenance) and were more flexible (zero warmup time instead of hours, single control of multiple units, all wheels driven, and smooth torque instead of pulsating, speed-range selection). They were far more cost-effective even though the N&W effectively owned its own coal fields.

I remember rushing down to the tracks to see these wonderful diesels come by for the first time. My reaction was, "That was it?" I realized I had witnessed the end of an era.

## N&W LOCOMOTIVES

The N&W was also unusual in that its Roanoke shops designed and built its own most famous locomotives. These were not the most powerful or the fastest in existence, but they were highly respected and probably represented the pinnacle of steam locomotive development.

The most famous was the class "J" streamliner that pulled the line's prized passenger trains, the Powhatan Arrow and the Pocahontas (I rode the latter). One of these was clocked at 115 mph on a regular run with a trainload

of unsuspecting passengers, a record that stood in the U.S. until the advent of the electric Metroliner between Washington and New York. Of advanced design, these could make the run from Norfolk, VA, to Cincinnati, OH, with minimal attentions and then be “turned around” in a few hours to make the trip back. It reportedly had the lowest percentage of down time to date, a very important financial consideration, and one of the main reasons diesels took over. This is the most powerful 4-8-2 (wheel arrangement) ever built.

The beast of the stable was the class “Y” 2-8-8-2 articulated freight loco, the strongest and heaviest type in general use on the line. When one went by the ground shook so badly that in the house of a friend by the tracks the (vacuum tube) TV would temporarily lose its picture. In long uphill tunnels, engineers reportedly got out and walked beside the locomotive to get breathable air. In pusher service, one once splintered a wood-frame caboose. Fortunately, the personnel had already been moved into the locomotive.

A close cousin was the more practical “A” class, a 2-6-6-4 articulated. It had less pull but developed its power over a broader range at higher speed. These were preferred for all but the most difficult coal runs.

### JAWN HENRY

The last gasp of the steam age was a steam turbine built for the N&W by the Baldwin-Lima-Hamilton locomotive works. It was quickly nicknamed after the John Henry of song, a legendary man who outdove a steam drill but died in the effort. More than 100 feet long and weighing 818,000 pounds, it had a 6-6-6-6 arrangement of wheels, all powered. Coal was carried on board. Water, which was the bigger problem for non-recycling units, required two tank-type tenders for long trips. Conventional locomotives had “fire-tube” boilers where tubes carry hot gases through a water tank. Jawn Henry had a “water-tube” or “flash-tube” boiler (reports differ) where a relatively



Last gasp of the steam age—Jawn Henry was his name. Photo: Norfolk Southern 1996 Stamp design © 1995, United States Postal Service.



“Y” class freight loco—most powerful beast in the N&W stable.

small quantity of water goes through tubes in a firebox. This is a safety advantage, because superheated water at 400°F and several hundred psi is virtually explosive. One of the conventional types literally blew itself in half, the two sections found 100 yards apart. Jawn used roughly double this temperature and pressure.

Initially there was talk of using powdered coal, which could be handled almost like oil, but the final unit apparently used conventional lump coal. Instead of pushing pistons, the steam turned a turbine. This turned a generator that supplied current to motors on the axles. These DC “traction motors” were already well proven on diesels. However, they did not cope well with the ash and cinders from coal. Maintenance was a serious problem. Jawn was relegated to pusher service on the Roanoke hill, conveniently near the repair shops, and scrapped after a few years. This was sad, as it not only had better characteristics than conventional steam, it was more fuel-efficient! It was not the most powerful unit ever nor the first steam turbine, but it had the most starting pull force ever—200,000 pounds. In pusher service it once pushed a steel-frame caboose up and over the preceding tank car.

I was fortunate to see Jawn Henry single-handedly pull a train of 200 loaded coal cars (they were smaller then) uphill. It looked like a moving building and sounded like a 747 jet. I took a color picture, but my old camera was leaking light so badly that the picture was totally ruined. This is unfortunate, as I have not yet been able to locate a good color picture.

### VIRGINIAN RAILWAY

The VGN was built with the express purpose of getting some of the N&W’s potential coal-hauling business. “No frills” is too kind an expression. Where the N&W fought the Great Dismal Swamp to reach Richmond, the VGN took an easier route and bypassed the state capital. In fact, the VGN

bypassed most towns and hauled little besides coal. It had one passenger train (required by law), pulled by a small steam loco with a malfunctioning cylinder valve. Ironically, this was the fastest train on our part of the line at the time (see later). It was a flag-stop local; you could be anywhere along the track and wave a white handkerchief to board. There was no air-conditioning. If you didn't get the windows up before the tunnel, you got dirty. Amenities consisted of a six-pack of lukewarm cokes served up by the conductor himself.

Whereas the N&W prided itself on the appearance of its trains (we once had the windows washed at a stop), the VGN could not care less.

The N&W was double-tracked with an electric-block-signal system. The VGN was single-track-with-passing sidings and relied on paper orders and signal flares. The N&W climbed to Christiansburg, VA, the second highest point on the main line at 2,000 feet; the VGN bored a tunnel almost a mile long under the crest—actually under the N&W Blacksburg branch. The VGN crossed the New River farther downstream, which required the biggest trestle ever built, but it placed the VGN above the N&W for the climb to Princeton/Bluefield, WV.



N&W "A" class loco at the Virginia Museum of Transportation, Roanoke.



A diesel of the Baltimore & Ohio makes a 1970s excursion in Maryland.

### THE SHARPEST CURVE

Castle Rock at Pembroke, VA, is a huge rock promontory that forces the New River to make a horseshoe bend. The tunnel here is the sharpest curve on the N&W main line. Rounding this curve, Jawn Henry peeled strips of steel from the rails, further discouraging its use.

### THE STRAIGHTEST TRACK

When the system eventually known as the N&W was put together from small lines, a major obstacle was the Great Dismal Swamp between Norfolk, VA, and Richmond, VA. While the experienced engineers argued over how to get around the worst of it, a young engineer named William Mahone devised a way to lay a roadbed straight through it. The result was a perfectly straight, perfectly level stretch of track on which a 115 mph speed record was later set.

Ironically, on this stretch of track some years after that, one of the same steam engines pulling a trainload of N&W employees on an excursion run suffered a derailment with fatalities, putting an end to these runs.



Steam lives on to climb Bald Knob Summit on West Virginia's Cass Scenic Railroad.

The N&W had many side branches—to small towns up and down the Shenandoah Valley and also along side creeks. The VGN went straight to the coal fields. The only branch in Virginia shown on my map is a spur from the docks to Norfolk itself. The VGN stopped short of Charleston, WV, the state capital, leaving it to the Chesapeake & Ohio (C&O) and Baltimore & Ohio (B&O).

By my time the VGN was electrified through the mountains, alternating current (AC) power from overhead lines drove AC motors directly. Direct current (DC) is impractical for distribution because transformers cannot be used. The locomotive had two speeds: around five mph for the yards and about 25 mph for the mainline. There was no rush when hauling coal; cost was the bottom line. An important advantage was that the motors of locos going downhill became generators, providing both braking and power returned to the lines to help another train going uphill. What if all trains were going downhill? The power plant had huge resistors out in the river to dissipate power as heat if necessary. What about the fish? They seemed to like it, especially in winter.

But again the versatility of DC-traction motors as used on the diesels was overwhelming. New locomotives, not surprisingly resembling diesels, had AC motors turning DC generators that in turn powered DC-traction motors on the axles. Eventually yet newer locomotives, again resembling the diesels of that day, employed huge vacuum-tube rectifiers to convert AC to DC. These could not return power to the lines, but diesels were on the horizon anyway.

East of the mountains, trains were pulled by steam locomotives similar to the N&W class "A." They were actually sisters to 2-6-6-6 units used on the C&O. At 7,500 hp, the latter were the most powerful steam units ever.

## EPILOGUE

Neither the N&W nor the VGN name remains today. The N&W bought the VGN in 1959. The old VGN track, having the better grade, is used for loaded trains while the N&W proper is used for the return empties. This left only one side with electrification, which was abandoned.

Several times the N&W had tried unsuccessfully to acquire other railroads to obtain an inroad to points south of VA. These instead became the Southern Railway, a prime competitor to the N&W. Finally in 1982 the two merged, creating today's Norfolk Southern, one of the mega-systems in the U.S.

I now live on a bend of the Patapsco River and have the original B&O, the first major railroad in the U.S., on three sides of me. The sound of a diesel horn is a poor substitute for that of a steam whistle, but it is better than nothing. A large number of abandoned lines are being re-opened for excursions, often with steam power. At last count I had ridden and photographed 32 of these. I find the real thing far more interesting than carnival rides, and some are just as scary!

## REFERENCES

1. *From Mine to Market*, Joseph T. Lambie, New York University Press, 1954
2. *Virginian Rails*, Kurt Reisweber, Old Line Graphics, 1993

**Arthur D. Delagrangé**, *Massachusetts Beta '62*, received a B.S. and M.S. from the Massachusetts Institute of Technology in 1962 and a Ph.D. from the University of Maryland in 1974, all in electrical engineering. He worked at the Naval Surface Warfare Center (now closed) in Silver Spring, MD, during 1959-94. Holder of nine patents, Art has authored 68 governmental reports, 22 articles in trade magazines, and a chapter in *The Art and Science of Analog Design*, edited by Jim Williams (Butterworth-Heinemann). He has written articles for THE BENT on the C&O Canal (Fall 1999), B&O Railroad (Spring 2000), automobiles (Spring and Fall 2001), race cars (Winter 2008), power boats (Summer 2002), and music (Winter 2003) [see [www.tbp.org](http://www.tbp.org)]. Since retiring, Art has done consulting both as a free lance and for Advanced Research and Technology, Burtonsville, MD. He and his wife Janice live near Mt. Airy, MD.



A vintage loco powers along with a head of steam.